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Columbia University Bulletin

College of
Pharmaceutical
Sciences

1968-1969

COLUMBIANA

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1968/69

To Communicate with the College

ADDRESS INQUIRIES TO: Director of Admissions, College of Pharmaceutical Sciences,
115 West 68th Street, New York, N.Y. 10023. Office hours: Monday through
Friday, 9 a.m. to 5 p.m.

TELEPHONE: (Area code 212) 877-1733

Accreditation

The College of Pharmaceutical Sciences is a member of the American Association of Colleges of Pharmacy and is accredited by the American Council on Pharmaceutical Education.

The College of Pharmaceutical Sciences reserves the right to make changes at any time in the curriculum, schedule, calendar, and regulations printed in this bulletin.

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College of
Pharmaceutical
Sciences

1968-1969

Columbia University in the City of New York

Academic Calendar, 1968-1969

Note that Columbus Day, Veterans Day, Lincoln's Birthday, and Washington's Birthday are not University holidays.

For additional dates special to the Ph.D. program, see the Academic Calendar in the Graduate Faculties bulletin.

AUTUMN TERM

- Sept 9** Monday. Graduate student orientation program.
- 11-17** Wednesday-Tuesday.* Pre-session orientation program for first-year undergraduate students.
- 16** Monday. Registration in the M.S. degree program.
- 17-18** Tuesday-Wednesday. Registration for Graduate Faculties students.
- 17-21** Tuesday-Saturday. Foreign Student Center orientation program for new foreign students (see page 39).
- 18** Wednesday.† Registration in the B.S. degree program for transfer and readmitted students.
- 19-20** Thursday-Friday.‡ Registration in the B.S. program for returning students.
- 25** Wednesday, through October 2, Wednesday. Late registration.
- 26** Thursday. Term begins for all degree candidates. Morningside campus classes begin. Last day to file *late* applications for October degrees.
- Oct 4** Friday. Last day to change programs.
- 30** Wednesday. Award of October degrees.
- Nov 5** Tuesday. Election Day. NOT a College holiday.
- 13** Wednesday. Midterm date.
- 28** Thursday, through December 1, Sunday. Thanksgiving Holidays.
- Dec 2** Monday.§ Last day to apply for February degrees (see January 23).
- 13** Friday. Last day to drop courses without penalty.
- 22** Sunday, through January 5, 1969, Sunday. Christmas Holidays.
- Jan 20-21** Monday-Tuesday. Reading period; no classes held.

*All new first-year undergraduate students register during the pre-session orientation program.

†Students allowed to register after the period specified must pay a late fee, and in the College of Pharmaceutical Sciences they must show satisfactory cause for the delay.

‡Students who apply after this date must pay a late fee.

- Jan 22–28** Wednesday–Tuesday. Midyear course examinations. Term ends.
23 Last day to file *late* applications for February degrees.

SPRING TERM

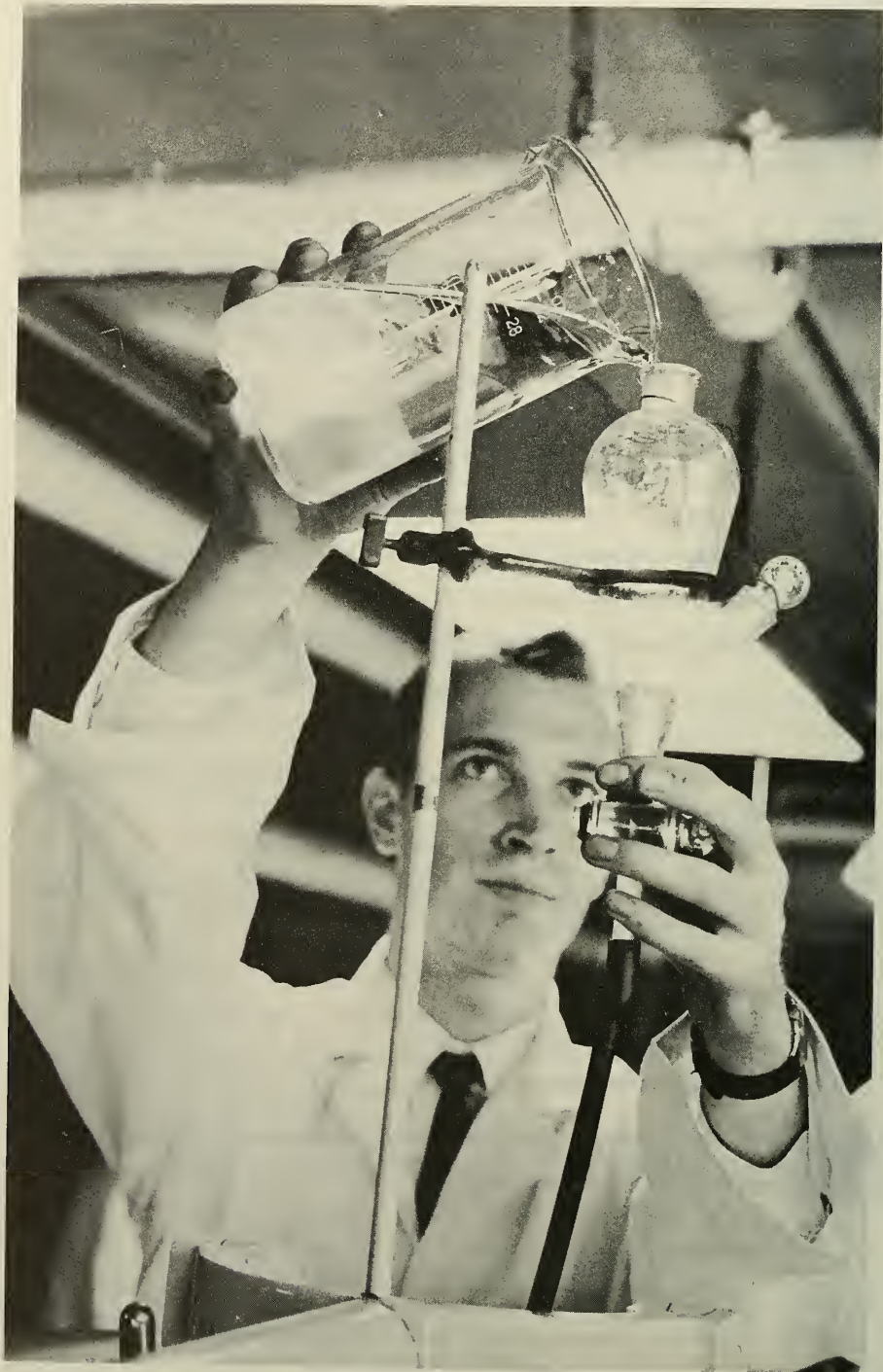
- Jan 29** Wednesday.* Registration in the M.S. degree program.
30–31 Thursday–Friday.* Registration in the B.S. degree program.
Feb 3 Monday. Term begins for all degree candidates. Last day to file essays for the M.S. degree to be awarded in February.
4 Tuesday. Award of February B.S. degrees.
5 Wednesday. Morningside campus classes begin.
14 Friday. Last day for change of programs.
26 Wednesday. Award of February M.S. degrees.
Mar 3 Monday.† Last day to apply for June degrees (see May 1).
28 Friday. Midterm date.
30 **Sunday, through April 6, Sunday. Spring Holidays.**
Apr 11 Friday. Last day to drop courses without penalty.
May 1 Thursday. Last day to file *late* applications for June degrees.
15 Thursday. Last day to file essays for the M.S. degree to be awarded in June.
19–20 Monday–Tuesday. Reading period; no classes held.
21–29 Wednesday–Thursday. Final examinations in the B.S. and M.S. degree programs. Term ends.

COMMENCEMENT

- June 1** Sunday. Baccalaureate Service.
3 Tuesday. **Conferring of degrees.**

*Students allowed to register after the period specified must pay a late fee, and in the College of Pharmaceutical Sciences they must show satisfactory cause for the delay.

†Students who apply after this date must pay a late fee.



LABORATORY EXPERIMENTATION DEVELOPS STUDENT INITIATIVE

College of Pharmaceutical Sciences

The College of Pharmacy had its inception in a meeting of prominent pharmacists of the city on March 18, 1829, when a constitution was adopted, membership conditions established, and provision made for conducting lecture courses. It has been continuously active as a teaching institution since that time. The first lecturers were Dr. John Torrey, in physics and chemistry, and Dr. Stephen Brown, in materia medica. The College was granted a charter on April 25, 1831, and three students were awarded diplomas in that year.

For seventy-five years the College, as a completely independent institution, grew steadily in stature and continuously developed more than a local interest. In 1851 delegates from the three other colleges of pharmacy then in existence were invited to meet to consider the establishment of standards for drugs. A second meeting for the same purpose was held in Philadelphia in 1852. As a result of these meetings the American Pharmaceutical Association was established. Since 1904 the College of Pharmacy has been affiliated with Columbia University, and its educational program has reflected the benefits of the union in breadth and in character.

The undergraduate program in pharmacy, leading to the degree of Bachelor of Science conferred by Columbia University, provides an appropriate balance of liberal arts, humanities, basic sciences, and professional courses. Electives permit the development of individual interests and talents as preparation for service in any of the many areas of pharmaceutical activity. The curriculum fulfills the requirements for admission to the state licensing examinations throughout the country.

Since 1897 the College has also provided opportunity for graduate study and research. The present graduate programs lead to the degrees of Master of Science and Doctor of Philosophy.

In 1966, by special action of the Board of Trustees, and with the authorization of the Board of Regents of the State Education Department of the State of New York, the name of the College was changed to the College of Pharmaceutical Sciences in the City of New York. This action was taken to convey more accurately the broader aspects of the educational programs and career opportunities in the pharmaceutical sciences provided by the modern curriculum of the College. The new title also signifies the new goals and objectives that the College seeks to achieve in the future.

The College works energetically to fulfill all three aspects of its obligation as an educational institution: through its library and archives, to conserve knowledge; through its teaching, to transmit knowledge; and, through the research of its faculty members, to extend the limits of knowledge.

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The Faculty of Pharmaceutical Sciences

Joseph L. Kanig, Ph. D. *Dean of the College of Pharmaceutical Sciences*

Samuel S. Liberman, M.A. *Associate Dean for Student Affairs*

Charles O. Beckmann. *Professor of Chemistry*

B.S., Brooklyn Polytechnic, 1924; M.A., Columbia, 1925; Ph.D., 1929

Lynne Belaief. *Assistant Professor of Philosophy*

B.A., Vassar, 1958; Ph.D., Columbia, 1963

Bernard P. Brennan. *Adjunct Professor of English*

B.S., Fordham, 1941; M.A., 1946; Ph.D., 1961

John J. Casazza, Jr. *Assistant Professor of Chemistry*

B.S., Scranton, 1952; M.S., Holy Cross, 1955; Ph.D., Fordham, 1965

Lucy W. Clausen. *Assistant Professor of Microbiology*

B.S., Long Island, 1931; M.A., New York University, 1945; Ph.D., 1947

Robert M. Dell. *Adjunct Professor of English*

B.A., Franklin and Marshall, 1942; M.A., Columbia, 1947; Ph.D., New York University, 1960

Rene L. Farhi. *Associate Professor of Pharmaceutical Chemistry*

B.S., St. Joseph (Lebanon), 1939; M.S., (chemistry), Centre Etudes (Lebanon), 1944; M.S. (mathematics), 1957; Ph.D., St. Joseph, 1962

Elmer L. Gaden, Jr. *Professor of Chemical Engineering*

B.S., Columbia, 1944; M.S., 1947; Ph.D., 1949

Suzanne A. Galton. *Assistant Professor of Chemistry*

B.S., Hunter, 1953; M.S., Polytechnic Institute of Brooklyn, 1960; Ph.D., 1963

Arthur H. Goldberg. *Assistant Professor of Pharmaceutics*

B.S., Columbia, 1956; M.S., 1966

Gilbert J. Hite. *Associate Professor of Pharmaceutical Chemistry*

B.S., New England College of Pharmacy, 1954; M.S., Wisconsin, 1957; Ph.D., 1959

Brian F. Hoffman. *Professor of Pharmacology*

B.A., Princeton, 1946; M.D., Long Island College of Medicine, 1949

George F. Horowitz. *Associate Professor of Pharmaceutical Administration*

B.S., College of the City of New York, 1933; LL.B., Columbia, 1938; M.B.A., 1954

Joseph L. Kanig. *Professor of Pharmaceutics*

B.S., Long Island, 1942; M.S., Columbia, 1949; Ph.D., New York University, 1960

Philip Keusch. *Adjunct Assistant Professor of Pharmaceutical Administration*

B.S., Columbia, 1950; M.S., Brooklyn, 1962

Naim Khazan. *Associate Professor of Pharmacology*

Ph.D., Royal College of Pharmacy and Chemistry, 1943; Ph.D., Hebrew, 1960

Martin Levin. *Adjunct Assistant Professor of English*

B.S., Columbia, 1940; M.A., 1949

Samuel S. Liberman. *Associate Professor of Chemistry*

Ph.G., College of Pharmacy, 1925; B.S., Columbia, 1927; M.A., New York University, 1933

Matthew Lipman. *Associate Professor of Philosophy*

B.S., Columbia, 1948; Ph.D., 1950

Spiro P. Loucas. *Assistant Professor of Pharmaceutical Chemistry*

B.S., Fordham, 1957; Ph.D., Rutgers, 1965

Edwin B. Matzke. *Professor of Botany*

B.A., Columbia, 1924; Ph.D., 1930

Philip C. Merker. *Professor of Pharmacology*

B.A., Brooklyn College, 1946; B.S., Long Island, 1951; M.S., Purdue, 1953; Ph.D., 1954

Frank J. Pokorny. *Associate Professor of Biology*

Ph.G., College of Pharmacy, 1925; Ph.Ch., Columbia, 1927; B.S., 1933; M.A., 1950

David Rittenberg. *Professor of Biochemistry*

B.A., College of the City of New York, 1929; Ph.D., Columbia, 1934

Margaret C. Staud. *Assistant Professor of Biology*

B.A., Columbia, 1940; M.A., Cornell, 1941; Ph.D., Columbia, 1967

Abraham Taub. *Distinguished Service Professor of Pharmaceutical Chemistry*

Ph.G., College of Pharmacy, 1920; Ph.Ch., Columbia, 1921; B.S., 1922; M.A., 1927

Jack Venema. *Adjunct Associate Professor of English*

B.A., Lake Forest, 1940; M.A., New York University, 1952

Norman D. Weiner. *Assistant Professor of Pharmaceutics*

B.S., Long Island, 1959; Ph.D., Columbia, 1965

Alfred V. Willi. *Associate Professor of Chemistry*

Ph.D., Zurich, 1949

► OTHER OFFICERS OF INSTRUCTION

INSTRUCTORS

Leonard Barmak, M.B.A.

(*Pharmaceutical Administration*)

Lena DeLisser, M.S. (*Chemistry*)

INSTRUCTORS *(continued)*

Richard Faust, Ph.D.
(Pharmaceutical Administration)
 Kurt Kleinmann, M.S.
(Pharmaceutics)
 Bernard Mehl, M.B.A.
(Pharmaceutics)

Gilbert Simon, M.S.
(Pharmaceutics)
 Richard Staum, M.A. *(Mathematics)*
 William Weinstein, B.S.
(Pharmaceutics)

ASSOCIATE

Eugene Erlich, M.A. *(English)*

LECTURERS

Irwin Gerson, M.B.A.
(Pharmaceutical Administration)
 Merrill Hessel, Ph.D. *(Physics)*
 Robert Leibson, B.S.
(Pharmaceutical Administration)

David Popofsky, M.S.
(Pharmaceutical Administration)
 Joel Wittenberg, B.S.
(Pharmaceutical Administration)

CHAIRMEN OF DIVISIONS OF INSTRUCTION

Joseph L. Kanig. *Pharmaceutics*
 George F. Horowitz. *Pharmaceutical Administration*
 Gilbert J. Hite. *Chemistry*
 Philip C. Merker. *Biological Sciences and Pharmacology*
 Matthew Lipman. *General Education*

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 Stephen M. Gross, B.S. *Assistant to the Dean and Director of Extension Services*
 Louis Kalb, B.A. *Bursar*
 Samuel S. Liberman, M.A. *Director of Admissions*
 Philip E. Monaco, B.S. *Assistant to the Dean*
 Monte P. Shepler, M.A. *Assistant Director of Student Personnel Services*
 Agnes Tiborcz, L.S. *Librarian*

OFFICERS EMERITI

Lewis N. Brown, Ph.D. *Professor Emeritus of Pharmacy*
 Sag Harbor, New York
 Fanchon Hart, M.A. *Professor Emeritus of Biology*
 Yorktown Heights, New York

The Bachelor of Science Program

The undergraduate program is a five-year program leading to the degree of Bachelor of Science in pharmaceutical sciences conferred by Columbia University. Candidates may either enroll in the College of Pharmaceutical Sciences for the entire program or, after completing up to two years of preprofessional studies elsewhere, enroll in the College for the remainder of their work.

To be awarded the degree, the candidate must meet the following requirements:

1. He must be of good moral character.
2. He must have completed at least one academic year of full-time study at this College.
3. He must have completed 165 points of course work in the curriculum established by the Faculty of the College or its equivalent.
4. He must have achieved a cumulative quality-point average of at least 2.0 for all course work completed during the time that the student is matriculated in the College.
5. He must have discharged all financial obligations to the College.

► ADMISSION REQUIREMENTS AND PROCEDURE

Both men and women are eligible for admission. An applicant must be in good health and must show evidence of good character. His secondary-school record must include at least 16 units of work completed in an approved four-year high school or the equivalent, thereby satisfying the requirements of the New York State Education Department for admission to the study of pharmacy. Although no specific program of secondary education is required, the following preparation is recommended:

	<i>Units</i>
English literature and composition	4
American history and social studies	2
Ninth-year mathematics or elementary algebra	1
Tenth-year mathematics or plane geometry	1
Eleventh-year mathematics or intermediate algebra	$\frac{1}{2}$ –1
Foreign language (one)	2
Chemistry	1
Academic electives	4–4½
	15½–16½

It is desirable for the applicant to include, as electives, additional courses in science (biology, physics) and in mathematics (trigonometry, advanced algebra).

A candidate whose preparation differs from that suggested above should consult the Office of Admissions of the College of Pharmaceutical Sciences for advice regarding his eligibility for admission.

ADMISSION PROCEDURE

Requests for information and for application forms should be addressed to the Office of Admissions, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023. The completed application, including the information to be supplied by the secondary school, may be submitted after the completion of six terms of secondary school studies.

All candidates are required to participate in the morning Scholastic Aptitude Test which is administered by the College Entrance Examination Board. For information about this test and for the application form, the candidate should write to the College Entrance Examination Board, Box 592, Princeton, N.J. 08540. The identification number assigned to the College of Pharmaceutical Sciences is 2103.

Each candidate must also file a medical and physical examination form completed by his personal physician.

An applicant who is accepted for admission must pay a commitment fee of \$50. This fee is credited to tuition if the applicant registers for the term to which he has been admitted; it is not refundable if the applicant withdraws.

Applicants are cordially invited to visit the College of Pharmaceutical Sciences for a conference with the Director of Admissions. Appointments may be made in advance by letter or by telephoning (area code 212) 877-1733.

ADVANCED PLACEMENT

Qualified students may be granted college credit for course work completed under the auspices of the Advanced Placement Program.

For advanced placement and credit in any subject, an entering student must have demonstrated proficiency in a college-level course completed in secondary school and in the Advanced Placement Examination administered by the College Entrance Examination Board.

Course credit may also be granted if an entering student has completed, with an acceptable score, a New York State College Proficiency Examination in a subject corresponding to a course in the curriculum of the College. When the course in question involves laboratory work, the student may be required to complete, with an acceptable grade, a laboratory examination administered by the appropriate division of the College.

ADVANCED STANDING

Advanced standing may be granted to an applicant who has completed course work in an accredited college or university. Candidates for admission with advanced standing should have satisfied all requirements for admission to the Bachelor of Science program and should file an advanced standing application form. The academic credentials to be submitted include an official transcript of secondary school studies, an official transcript of the college record, and a certificate of honorable

dismissal, or one indicating that the candidate is entitled to honorable dismissal, from each college attended. Each document must be sent directly from the Registrar's Office of the school which the candidate has attended to the Office of Admissions of the College of Pharmaceutical Sciences, Columbia University. A marked catalogue showing courses completed in the college or university should be submitted for purposes of evaluation. No credit may be given for any course in which a grade lower than C (or its equivalent) has been earned.

Special requirements for admission to the second preprofessional year: A candidate who has completed at least 32 points (semester hours) of course work in an accredited college or university may be admitted with advanced standing to the second preprofessional year, provided courses in general chemistry, qualitative analysis, and college mathematics (including a first course in calculus) are included.

Special requirements for admission to the professional program: An applicant who has completed at least 64 points (semester hours) of course work in an accredited college or university may be admitted to the first year of the professional program (the third year of the five-year program), provided he has completed the following courses (or their equivalents) with acceptable grades:

General chemistry and qualitative analysis
 Biology (botany-zoology)
 Mathematics
 Organic chemistry
 General physics
 English literature and composition

The balance of the 64 points (semester hours) required should be taken in additional work in the subjects named above and in the social sciences, in a foreign language, and in literature and the fine arts.

ADMISSION BASED ON FOREIGN STUDY

An applicant whose academic preparation was completed in schools outside of the United States of America must have received approval of his educational experience from the New York State Education Department before consideration can be given to the application. The admission procedure is as follows:

1. Collect original scholastic credentials and have photocopies prepared, in duplicate.
2. Have certified translations made of these credentials (if in a language other than English). These should be in duplicate.
3. Arrange to have Form F-PH completed in its *entirety* and in duplicate.
4. File the completed Form F-PH, original scholastic credentials, certified translations, photocopies of credentials, and any other pertinent documents with the Office of Admissions, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023.

If the mails are used, please send documents by *registered mail*.

► THE CURRICULUM

		<i>Class Hours</i>	<i>Lab Hours</i>	<i>Points</i>
FIRST YEAR				
Chemistry 113–114	General chemistry and qualitative analysis	4	4	10
General Education 411–412	English	3		6
General Education 414	Introduction to scientific method	3		3
General Education 417	Elementary functions	5		4
General Education 418	Calculus, I	5		4
General Education 419	Introduction to philosophy	3		3
SECOND YEAR				
Biological Sciences and Pharmacology 523	Botany	2	4	4
Chemistry 121–122	Organic chemistry	3	4	10
General Education 421	Contemporary civilization A	3		3
General Education 422	Behavioral sciences, I	3		3
General Education 423–424	General physics	3	2	8
Biological Sciences and Pharmacology 524	Zoology	3	3	4
THIRD YEAR				
Chemistry 130	Biochemistry	3	3	4
Chemistry 133	Quantitative inorganic analysis	3	4	5
Chemistry 136	Pharmaceutical analysis	2	4	4
Pharmaceutical Administration 331	Principles of economics	3		3
Pharmaceutics 230	Introduction to pharmacy	2		2
Pharmaceutics 233	Physical pharmacy, I	3		3
Pharmaceutics 234	Physical pharmacy, II	3	4	5
Pharmaceutical Administration 334	Accounting principles	3		3
Biological Sciences and Pharmacology 531	Mammalian physiology	4	3	5
FOURTH YEAR				
General Education 441	Effective communication	3		3
Biological Sciences and Pharmacology 543	Microbiology	3	4	5
Biological Sciences and Pharmacology 540	Pharmacognosy	3	3	4

		<i>Class Hours</i>	<i>Lab Hours</i>	<i>Points</i>
FOURTH YEAR (continued)				
Biological Sciences and				
Pharmacology 542	Public health	2		1
Pharmaceutics 241	Dispensing pharmacy, I	3	3	4
Pharmaceutics 242	Dispensing pharmacy, II	3	4	5
Pharmaceutical				
Administration 345	Principles of marketing	3		3
Pharmaceutical				
Administration 346	Pharmaceutical jurisprudence	3		3
	Electives			0-8
FIFTH YEAR				
General Education 451	Behavioral sciences, II	3		3
General Education 452	Behavioral sciences, III	3		3
Biological Sciences and				
Pharmacology 553	Pharmacology, I	4		4
Biological Sciences and				
Pharmacology 554	Pharmacology, II	3	3	4
Pharmaceutics 253	Dispensing pharmacy, III	2	3	3
Chemistry 155-156	Pharmacy and chemistry of medicinals	3		6
Pharmaceutical				
Administration 354	Community pharmacy management	2	2	3
	Electives			0-14

► COURSES OF INSTRUCTION

HOW COURSES ARE NUMBERED

Each course number in the Bachelor of Science program consists of three digits. The meanings assigned apply only to College of Pharmaceutical Sciences courses.

The *first* digit indicates the division of study in the College:

- | | | |
|------------------------|----------------------------|------------------------------|
| 1 <i>Chemistry</i> | 3 <i>Pharmaceutical</i> | 5 <i>Biological Sciences</i> |
| 2 <i>Pharmaceutics</i> | <i>Administration</i> | <i>and Pharmacology</i> |
| | 4 <i>General Education</i> | |

The *second* digit indicates the class year or electives:

- | | |
|----------------------|--|
| 1 <i>First year</i> | 5 <i>Fifth year</i> |
| 2 <i>Second year</i> | 6 or 8 <i>Elective</i> |
| 3 <i>Third year</i> | 7 <i>Elective which carries both</i> |
| 4 <i>Fourth year</i> | <i>graduate and undergraduate credit</i> |

The *third* digit indicates the term in which the course is given. An odd number signifies the autumn term; an even number signifies the spring term. For example, a second-year chemistry course given in the spring term could be numbered 123.

Two hyphenated numbers, one odd and the other even, signify a course that runs through both terms. The first half is prerequisite to the second half unless the course description says otherwise.

POINTS OF COURSE CREDIT

The number of points of credit a course carries *each term* is given in boldface type on the right margin of the course entry.

The College reserves the right to withdraw or modify the courses of instruction or to change the instructors at any time.

FIRST YEAR

Chemistry 113–114. General chemistry and qualitative analysis. 5 pts.

3 hours lecture, 4 hours laboratory, and 1 hour conference. Professor Loucas and assistants.

The fundamental concepts and theories of modern chemistry, including the principles of inorganic qualitative analysis.

General Education 411–412. English. 3 pts.

3 hours lecture. Professor Levin.

Rhetoric and usage; analysis of literary forms; selected readings in British and American literature.

General Education 414. Introduction to scientific method. Spring. 3 pts.

3 hours lecture. Professor Lipman.

A basic course in elementary logic, intended to provide an understanding of the origin and testing of scientific theories and the language of science.

General Education 417. Elementary functions. Autumn. 4 pts.

4 hours lecture, 1 hour conference. Mr. Staum.

A review of algebra, and an introduction to trigonometric, exponential, and logarithmic functions.

General Education 418. Calculus, I. Spring. 4 pts.

4 hours lecture, 1 hour conference. Mr. Staum.

Prerequisite: *General Education 417.*

Differential calculus, including differentiation of composite functions and of trigonometric, exponential, and logarithmic functions; with applications in rates of change, approximations, maxima and minima, and graphing. Integral calculus, including elementary integration; with applications in areas, volumes, arc lengths, moments, pressure, and work.

General Education 419. Introduction to philosophy. Autumn. 3 pts.

3 hours lecture. Professor Lipman.

Fundamental problems in social and ethical philosophy, with class discussion based upon the arguments developed by classical and contemporary philosophers.

SECOND YEAR

Biological Sciences and Pharmacology 523. Botany. Autumn. 4 pts.

2 hours lecture, 4 hours laboratory. Professor Pokorny and assistants.

The morphology, histology, cytology, genetics, and certain physiological processes of the higher plants. The evolutionary development of plant life, shown through a study of the different phyla.

Chemistry 121-122. Organic chemistry. 5 pts.

3 hours lecture, 4 hours laboratory. Professor Galton and assistants.

Prerequisite: *Chemistry 114*.

A comprehensive course in elementary organic chemistry, based on modern theoretical principles. Synthesis and reactions of the different classes of organic compounds in the aliphatic and aromatic series, including applications to medicinal compounds.

General Education 421. Contemporary civilization A. Autumn. 3 pts.

3 hours lecture. Professor Belaief.

The main streams of thought and action which have contributed to the development of Western civilization. Readings of original works which have been and are of social or cultural importance, including those of Aristotle, Aquinas, Luther, Galileo, and Rousseau.

General Education 422. Behavioral sciences, I. Spring. 3 pts.

3 hours lecture. Professor Belaief.

Our present-day society as viewed and appraised by the social sciences, with emphasis on the impact of technology and industrialization, the distribution of economic powers, the relationships between society and the individual, and kinds of social organization and disorganization. Readings include selections from Freud, Dewey, Gandhi, Galbraith, Riesman, and others.

General Education 423-424. General physics. 4 pts.

2 hours lecture, 2 hours laboratory, and 1 hour conference. Dr. Hessel.

Prerequisite: *General Education 418* or the equivalent.

An introductory course on the results, methods, and spirit of the science.

Biological Sciences and Pharmacology 524. Zoology. Spring. 4 pts.

3 hours lecture, 3 hours laboratory. Professor Staud and assistants.

A survey of the animal kingdom, including the taxonomy, morphology, physiology, development, and evolution of representative species of the major phyla, with special emphasis on the vertebrates. In the laboratory, representative forms are studied by means of microscopic and macroscopic observations, dissections, and demonstrations.

THIRD YEAR**Chemistry 130. Biochemistry. Spring. 4 pts.**

3 hours lecture, 3 hours laboratory. Professor Loucas, Miss DeLisser, and assistants.

Prerequisite: *Chemistry 122* and *133*, and *Biological Sciences and Pharmacology 524*, or their equivalents.

An introduction to certain aspects of enzymes and the intermediary metabolism of carbohydrates, lipids, proteins, and nucleic acids.

Chemistry 133. Quantitative inorganic analysis. Autumn. 5 pts.

3 hours lecture, 4 hours laboratory. Professor Casazza, Miss DeLisser, and assistants.

Prerequisite: *Chemistry 114* and *General Education 418* and *422*.

The theory and chemical calculations of inorganic quantitative analysis. Laboratory work: the important volumetric and gravimetric methods.

Chemistry 136. Pharmaceutical analysis. Spring. 4 pts.

2 hours lecture, 4 hours laboratory. Professor Casazza, Miss DeLisser, and assistants.

Prerequisite: *Chemistry 122* and *133*, or their equivalents.

Application of the principles of quantitative analysis, including instrumental and physicochemical methods, to the examination of some pharmaceutical preparations.

Pharmaceutical Administration 331. Principles of economics. Autumn. 3 pts.

3 hours lecture. Professor Horowitz.

An introduction to economic analysis; functions of the price system, national income, money and banking, economic fluctuations and fiscal policy, supply and demand, competition and monopoly, the development of modern economic systems.

Pharmaceutics 230. Introduction to pharmacy. Spring. 2 pts.

2 hours lecture. The staff.

The professional principles which are basic to the sciences of pharmacy, including elements of pharmaceutical calculations.

Pharmaceutics 233–234. Physical pharmacy, I and II. 233: 3 pts. 234: 5 pts.

233: 3 hours lecture. 234: 3 hours lecture, 4 hours laboratory. Professor Weiner and assistants.

Prerequisite: *Chemistry 122* and *General Education 424*, or their equivalents.

Fundamental physicochemical principles applicable to pharmaceutical systems. Emphasis is on thermodynamics, chemical kinetics, phase equilibria, solubility, interfacial phenomena, disperse systems, and other topics basic to an understanding of pharmaceutical formulations and drug activity.

Pharmaceutical Administration 334. Accounting principles. Spring. 3 pts.

3 hours lecture. Professor Horowitz.

An introduction to the basic theory of recording and reporting financial transactions, with emphasis on the evaluation and utilization of financial data for managerial purposes.

Biological Sciences and Pharmacology 531. Mammalian physiology. Autumn. 5 pts.

3 hours lecture, 3 hours laboratory, and 1 hour conference. Professor Staud and assistants.

Prerequisite: *Biological Sciences and Pharmacology 524* or the equivalent.

The physical and chemical processes, as well as nervous and humoral factors, that are responsible for integrative functioning of normal living mammalian cells, tissues, organs, and organ systems. Laboratory experiments and observations are concerned with fundamental physiological processes.

FOURTH YEAR**General Education 441. Effective communication. Autumn. 3 pts.**

3 hours lecture. Professors Brennan, Dell, and Venema.

Prerequisite: *General Education 411* and *412*, or their equivalents.

The elements of effective speaking: organization of ideas, enunciation, diction, poise, and technique, as applied to both conversation and formal speech. Criticism of talks prepared and delivered by students.

Biological Sciences and Pharmacology 543. Microbiology. Autumn. 5 pts.

3 hours lecture, 4 hours laboratory. Professor Clausen and assistants.

Prerequisite: *Biological Sciences and Pharmacology 523* and *Chemistry 130*, or their equivalents.

General principles of microbiology, with special emphasis on the physiology of pathogenic microorganisms. Symptomatology; prophylaxis; epidemiology of the causative agents of bacterial, rickettsial, and viral infections; and laboratory methods for identification of the organisms involved. Laboratory exercises on standard methods for identification of microbial organisms, the examination of water and milk, and the testing of disinfectants and antibiotics.

Biological Sciences and Pharmacology 540. Pharmacognosy. Spring. 4 pts.

3 hours lecture, 3 hours laboratory. Professor Pokorny and assistants.

Prerequisite: *Biological Sciences and Pharmacology 523* and *Chemistry 122*, or their equivalents.

Biochemical constituents of the official and certain nonofficial drugs of plant and animal origin, including plant hormones, antibiotics, allergens, insecticides, and related topics. Laboratory work: the microchemistry and microscopy of certain selected drugs, including the application of the techniques of micrometry, chromatography, and polarized light.

Biological Sciences and Pharmacology 542. Public health. Spring. 1 pt.

2 hours conference. Professor Clausen.

Prerequisite: *Biological Sciences and Pharmacology 531* and *543*, or their equivalents.

Aspects of public health applicable to the pharmacist as a health consultant. Participation in health agency programs.

Pharmaceutics 241–242. Dispensing pharmacy, I and II. 241: 4 pts. 242: 5 pts.
 241: 3 hours lecture, 3 hours laboratory. 242: 3 hours lecture, 4 hours laboratory.
 Mr. Weinstein and assistants.

Prerequisite: *Pharmaceutics 234*.

The application of physicochemical principles to manufacturing and compounding techniques. Introduction to extemporaneous formulating and prescription compounding. Comparison of the various dosage forms in which medication can be dispensed. Elements of pharmaceutical calculations and the Latin of current use.

Pharmaceutical Administration 345. Principles of marketing. Autumn. 3 pts.
 3 hours lecture. Professor Horowitz.

Introduction to marketing management, using situations from the pharmaceutical industry. Factors affecting consumer demand and methods of satisfying it; market structure and channels; product policy, including selection and methods of buying; promotion policy, including location analysis, selling, and advertising; pricing policy, including a professional basis; governmental framework of regulation.

Pharmaceutical Administration 346. Pharmaceutical jurisprudence. Spring. 3 pts.
 3 hours lecture. Professor Horowitz.

Introduction to nature and function of law and basic elements of American governmental system; detailed analysis of statutes, administrative regulations, common law rules, and codes of ethics which affect the practice of pharmacy.

FIFTH YEAR

General Education 451. Behavioral sciences, II. Autumn. 3 pts.
 3 hours lecture. Professor Belaief.

Prerequisite: *General Education 422*.

The nature of the individual and his situation in the modern world. Materials drawn primarily from psychology, psychoanalysis, and psychiatry, and secondarily from relevant materials in related social sciences such as anthropology and sociology. Emphasis is on comparison and appraisal of the various leading theories of individuality.

General Education 452. Behavioral sciences, III. Spring. 3 pts.
 3 hours lecture. Professor Lipman.

Prerequisite: *General Education 422*.

The structure of society. Alternative theories of the structure of society. Orientation is primarily sociological but includes relevant materials from social psychology, philosophy, and related disciplines.

Biological Sciences and Pharmacology 553–554. Pharmacology, I and II. 4 pts.
 553: 4 hours lecture. 554: 3 hours lecture, 3 hours laboratory. Professor Merker and assistants.

Prerequisite: *Chemistry 130* and *Biological Sciences and Pharmacology 531*, or their equivalents.

The effects of drugs and poisons on normal and diseased mammalian cells, tissues, and organs; the therapeutic uses of drugs in relation to the pathologic state or processes associated with disease. Laboratory exercises emphasize the principles of biological assay and drug testing.

Pharmaceutics 253. Dispensing pharmacy, III. Autumn. 3 pts.
 2 hours lecture, 3 hours laboratory. Instructor to be announced.

Prerequisite: *Pharmaceutics 242*.

Modern dosage forms, including principles of cosmetic technology. Laboratory exercises with prescriptions requiring special compounding techniques and the correction of incompatibilities. Formulation and evaluation of medicinal and cosmetic products.

Chemistry 155–156. Pharmacy and chemistry of medicinals. 3 pts.
 3 hours lecture. Professor Hite.

Prerequisite: *Chemistry 130*, *Biological Sciences and Pharmacology 531*, and *Pharmaceutics 242*.

A systematic study of the pharmacy and chemistry of organic pharmaceutical and medicinal substances, with attention to the biochemical and pharmacological aspects.

Pharmaceutical Administration 354. Community pharmacy management.

2 hours lecture, 2 hours laboratory. Mr. Barmak.

Spring. 3 pts.

Procedures, techniques, and underlying concepts in planning, organizing, directing, and controlling a community pharmacy in the current environment.

ELECTIVE COURSES

Depending on his major interests, a student may select courses from the following to meet the requirements for graduation. A student interested in graduate study should take work in calculus, physical chemistry, and also in a foreign language.

Chemistry 161. Elementary clinical analysis.**Autumn. 3 pts.**

3 hours lecture. Instructor to be announced.

Prerequisite: *Chemistry 130 and 133, and Biological Sciences and Pharmacology 531.*

Routine tests as well as recent advances in clinical chemistry, with emphasis on pathologic alterations of tissues.

Chemistry 163. Pharmaceutical control methods.**Autumn. 4 pts.**

2 hours lecture, 4 hours laboratory. Professor Farhi.

Prerequisite: *Chemistry 136* or the equivalent.

Introduction to optical, electrical, and radiometric methods of chemical analysis. Discussion of the quality control system. The laboratory experiments demonstrate the use of the instrumental methods in pharmaceutical analysis.

Chemistry 172. Advanced organic chemistry.**Spring. 3 pts.**

3 hours lecture. Professor Willi.

Prerequisite: *Chemistry 176* or the equivalent.

Mechanisms of organic reactions, reactivity and stereochemistry of organic compounds presented on a modern physical chemical basis: bond orbitals, polarity and resonance of organic molecules, strengths of acids and bases, substituent effects, mechanisms of nucleophilic, aliphatic and aromatic substitution, elimination, carbonyl addition, rearrangements, free radical reactions, some novel reactions, conformational analysis, and configurational analysis.

Chemistry 174. Advanced qualitative organic analysis.**Spring. 2 pts.**

4 hours laboratory to be arranged. Professor Galton.

Prerequisite: *Chemistry 122 and 172*, or their equivalents.

Isolation, identification, and purification of organic compounds by modern instrumental and classical wet methods.

Chemistry 175–176. Elementary physical chemistry.**3 pts.**

3 hours lecture, 1 hour conference. Professor Farhi.

Prerequisite: *General Education 424 and 466, and Chemistry 122.*

The physical description of chemical species and reactions. Introduction to modern theories. 91: Chemical thermodynamics, kinetic theory and chemical kinetics, electrochemistry. 92: Quantum mechanics, atomic and molecular structure, chemical statistics and applications, nuclear and photochemistry.

Chemistry 167–168. Projects in chemistry.**2 or 3 pts.**

4 to 6 hours conference and laboratory. The staff.

General Education 461. Political ideologies.**Autumn. 3 pts.**

3 hours lecture. Professor Lipman.

An introduction to the nature of ideology, and a comparison of the arguments for the major ideologies of the past century: conservatism, liberalism, socialism, and fascism.

General Education 463. An introduction to modern poetry.**Autumn. 3 pts.**

3 hours lecture. Professor Lipman.

Nineteenth- and twentieth-century English and American poetry.

General Education 465-466. Calculus, II and III.

4 pts.

4 hours lecture. Mr. Staum.

Prerequisite: *General Education 418.*

Hyperbolic functions; techniques and applications of integration; parametric representation; polar coordinates; three-dimensional analytic geometry; vector analysis; partial derivatives; multiple integrals; power series and Taylor series.

Biological Sciences and Pharmacology 561. Parasitology and mycology. Spring. 3 pts.

2 hours lecture, 3 hours laboratory. Professor Clausen and assistants.

Prerequisite: *Biological Sciences and Pharmacology 543.*

The animal parasites and fungi which cause disease in man and animals. The biology, morphology, host relationships, and epidemiology of the etiological agents associated with parasitoses and mycoses.

Biological Sciences and Pharmacology 563. Human genetics. Autumn. 2 or 3 pts.

2 hours lecture. Professor Staud.

Prerequisite: *Biological Sciences and Pharmacology 531 and Chemistry 130.*

Basic concepts of genetics and their application to human heredity.

Biological Sciences and Pharmacology 564. Problems in human genetics.

Seminar. Professor Staud.

Spring. 2 pts.

Prerequisite: *Biological Sciences and Pharmacology 563.*

The exploration of problems relating to human genetics defects.

Biological Sciences and Pharmacology 567. Advanced microscopy and plant histology. Autumn. 3 pts.

3 hours lecture. Professor Pokorny.

Methods of preparing histological sections of plant specimens by means of a microtome, the proper staining and mounting procedures, and paraffin infiltration techniques are included.

Biological Sciences and Pharmacology 565-566. Projects in biological sciences and pharmacology. 2 or 3 pts.

4 to 6 hours conference and laboratory. The staff.

Pharmaceutics 273. Principles of industrial pharmaceutics, I. Autumn. 4 pts.

2 hours lecture, 4 hours laboratory. Professor Kanig and assistant.

Prerequisite: *Pharmaceutics 242.*

The principles underlying the unit operations employed in the pharmaceutical industry in the production of all types of dosage forms. Laboratory exercises conducted with pilot plant equipment in the Industrial Pharmacy Laboratory.

Pharmaceutics 274. Principles of industrial pharmaceutics, II. Spring. 4 pts.

2 hours lecture, 4 hours laboratory. Professor Kanig and assistant.

Prerequisite: *Pharmaceutics 273.*

The physical factors and equipment employed in pharmaceutical manufacturing operations are discussed and evaluated. The influences of the processes and equipment on the biological activity, quality, and stability of dosage forms are emphasized, both in theory and in practice through special projects.

Pharmaceutics 263-264. Projects in pharmaceutics. 2 or 3 pts.

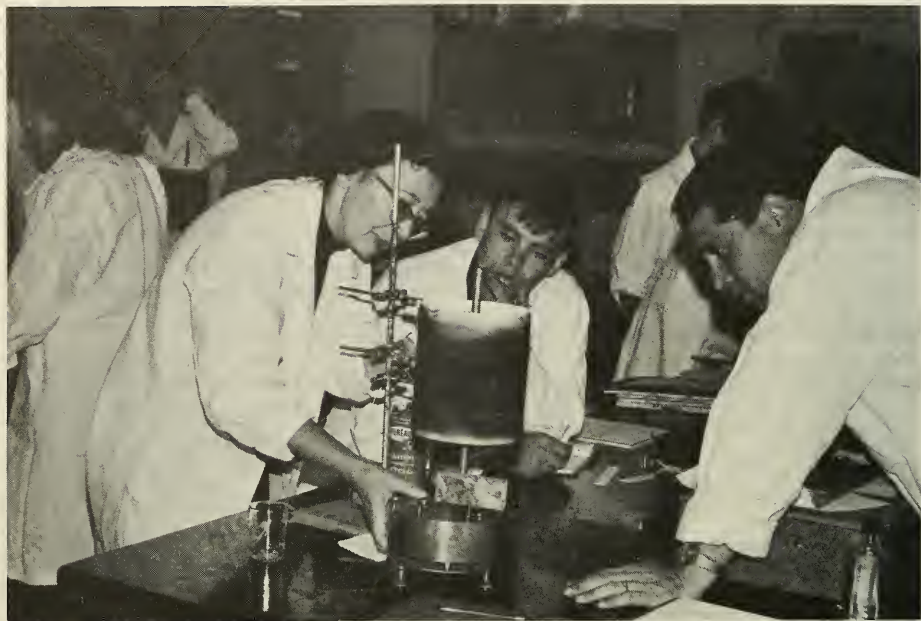
4 to 6 hours conference and laboratory. The staff.

Pharmaceutics 265. Institutional pharmacy. Autumn. 4 pts.

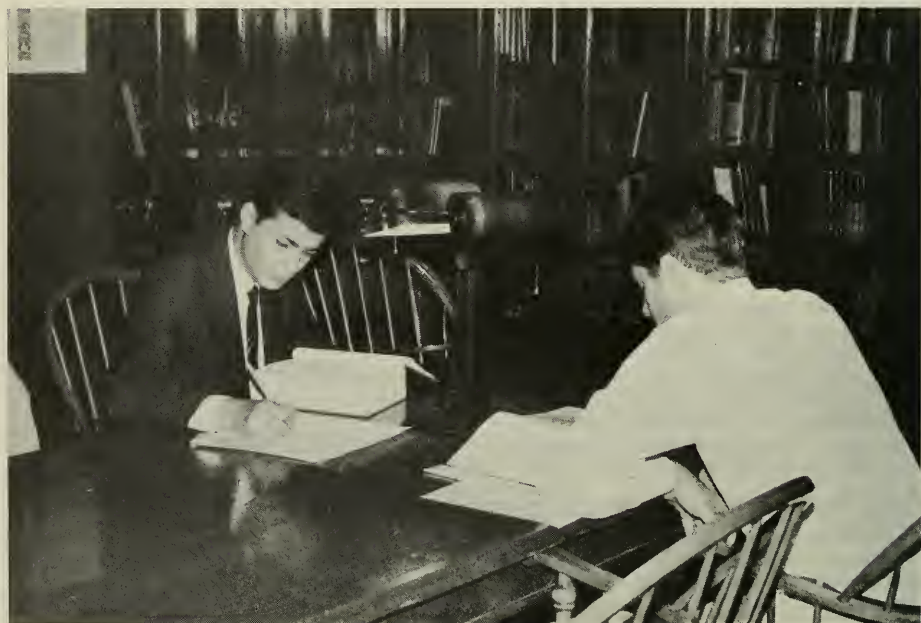
3 hours lecture, 2 hours laboratory. Messrs. Kleinmann, Mehl, and Simon.

An introduction to hospital organization and related facilities. Goals, standards of practice, policies and procedures, and administration of pharmacy services within and for the institution. The relationship of the pharmacy to other departments. Laboratory consists of visitation to neighboring hospitals and related facilities.

- Pharmaceutical Administration 369. Statistical analysis.** Autumn. 3 pts.
3 hours lecture. Mr. Wittenberg.
An introduction to statistical inference, probability theory, sampling theory, and computer logic and language, with stress on evaluation of data and reports.
- Pharmaceutical Administration 362. Marketing and advertising procedures.** Spring. 3 pts.
3 hours lecture. Messrs. Keusch and Popofsky.
Pharmaceutical industry marketing and advertising techniques and strategy. Topics include the marketing project team concept; promotional mix; market and advertising research; test marketing; concept testing; preparation of advertising campaigns utilizing such media as journals, direct mail, conventions, house organs, and closed circuit television. All material presented is based on actual case studies.
- Pharmaceutical Administration 361. Sales management and promotion.** Autumn. 3 pts.
3 hours lecture. Messrs. Gerson and Leibson.
Recommended preparation: *Pharmaceutical Administration 345 and 362.*
Sales and promotional activities of drug manufacturers to the health professions and of retail pharmacies to the public. Product and claims development for increased sales appeal. Organization and development of the manufacturer's sales force, selection and training of professional service representatives, the functions of the individual detailman. Retail pharmacy practices, including interprofessional relations, sales promotion, and salesmanship. All material presented is based on actual case studies.
- Pharmaceutical Administration 364. Pharmaceutical economics.** Spring. 3 pts.
3 hours lecture. Instructor to be announced.
Prerequisite: *Pharmaceutical Administration 331.*
A socioeconomic study of health care and the role of pharmacy. The supply and distribution of health resources, the extent and distribution of the need for health services, and the patterns of consumer spending for health services. Voluntary, cooperative, and governmental plans and organizations providing health service on a prepayment, insurance, or welfare basis. The socioeconomic role of the drug industry and the pharmacy profession.
- Pharmaceutical Administration 366. Business law principles.** Spring. 3 pts.
3 hours lecture. Professor Horowitz.
Law as a tool of administration; for avoidance of legal difficulties; as promotion of legislative and administrative objectives. Substantive law of torts, contracts, property, agency, partnership, corporation, and trade regulation.
- Pharmaceutical Administration 367-368. Seminar in pharmacy administration.** 3 pts.
3 hours conference. Professor Horowitz and staff.
Either term may be taken separately.
Prerequisite: the instructor's permission.
Each student selects one of the following fields for intensive study of administrative practice and strategy: manufacturing, wholesaling, retailing, international operations, professional organizations, hospitals and other institutions. A term project and oral reports are required.
- General Education 467. Principles of ethics.** Autumn. 3 pts.
3 hours lecture. Professor Belaief.
Readings and discussion in the theory of moral conduct, directed toward inquiry into the foundations of our ethical values, in a secular perspective.
- General Education 468. Philosophy of religion.** Spring. 3 pts.
3 hours lecture. Professor Belaief.
The nature of religious experience through analysis of key concepts such as God, immortality, and evil. Readings in Augustine, Kierkegaard, Luther, Tillich, and Eliade.
- General Education 460. Theories of knowledge and experience.** Spring. 3 pts.
3 hours lecture. Professor Lipman.
Traditional and contemporary philosophical interpretations of the way we experience the external world, and how we extract knowledge of the world from that experience.
- General Education 484. Introduction to fine arts.** Spring. 3 pts.
3 hours lecture. Professor Lipman.
A presentation of major works among the plastic arts: painting, sculpture, and architecture, with the aim of encouraging appreciation and understanding.



AN EXPERIMENT IN PHYSIOLOGY



STUDENTS CHECK REFERENCE MATERIALS IN THE LIBRARY

Graduate Study in the Pharmaceutical Sciences

Graduate study in the pharmaceutical sciences at Columbia leads to the degrees of Master of Science and Doctor of Philosophy. Requirements for the M.S. degree are set by the College of Pharmaceutical Sciences; those for the Ph.D. degree are administered by the Joint Committee on Graduate Instruction of the Graduate Faculties through its Subcommittee on Pharmaceutical Sciences.

► PLACEMENT EXAMINATIONS

All graduate students are required to take placement examinations before they register for their first term of residence. The results are used in advising students on their programs of study. Opportunities are afforded the student to make up any deficiencies through assignment to appropriate course work. If, in the judgment of the Graduate Committee, the student's undergraduate background is incomplete, he may be required to complete more than the minimum number of points of course work prescribed for the degree.

► TEACHING ASSISTANTSHIPS

A number of teaching assistantships are granted to graduate degree candidates on the basis of outstanding achievements. Stipends of \$2,500 extend for ten months.

► COMMITTEE ON GRADUATE WORK

The Graduate Committee supervises the program of study and reviews the performance of all graduate students at regular intervals. The Graduate Committee will require a student to withdraw if his performance is deemed unsatisfactory.

► THE MASTER OF SCIENCE PROGRAMS

The Master of Science programs are designed for the student who desires to advance his knowledge of the pharmaceutical sciences and to develop professional competence in a given area. The student must show that he is able to undertake a limited research project. The M.S. degree is recommended but not required for completion of the Ph.D. degree.

REQUIREMENTS FOR ADMISSION

1. The applicant must hold a bachelor's degree from an institution approved by the College.

2. He must supply official transcripts of all previous college or university study and recommendations from former instructors testifying to his outstanding training and ability.

An applicant whose undergraduate studies were undertaken in a foreign country must supply complete certified translations of all his credentials. He must be proficient in writing, reading, and speaking English. If his native language is not English, he must take the English Language Placement Test, which is administered by the American Language Program, Foreign Student Center, Columbia University. The examination will be given just before he enrolls for his first term in the College. If, in the judgment of the Graduate Committee, a student lacks the necessary command of the English language, he may be required to complete suitable preparation in this subject in order to meet the minimum residence requirements for the master's degree. A reduced course load during this instruction is necessary in most cases. He must also certify that he has sufficient funds to meet both living expenses and the expenses of graduate study.

ADMISSION PROCEDURE

Requests for application forms for admission to the Master of Science program should be addressed to the Office of Graduate Admissions, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023.

New students usually begin their graduate study in September. Applicants are urged to submit their complete applications and supporting documents before March 1 of the year in which study is to begin. Later applications are considered if space and facilities permit. New students are admitted in the spring term or in the College summer session only if facilities are available and suitable programs can be planned.

An applicant who is accepted for admission is required to furnish a \$50 commitment fee, which will be applied toward tuition and other fees at the time of registration. This fee is not refundable if the applicant withdraws.

A student who accepts a graduate scholarship, fellowship, traineeship, or assistantship may accept a scholarship, fellowship, traineeship, or assistantship from another institution by submitting a written resignation from his first appointment by April 14. However, after April 14 a student must obtain a formal release from his first appointment before accepting a second one.

PROGRAM IN PHARMACEUTICAL SCIENCES

Because research areas in the pharmaceutical sciences are diverse and are dependent upon basic physical and biological sciences, the graduate student is encouraged to obtain a sound background in physics, chemistry, and biology. Illustrative research problems include the design and synthesis of medicinal compounds; absorption, distribution, detoxication, and excretion of drugs; the relationships between the pharmacological activity of drugs and their chemical structures; the

physicochemical properties of pharmaceutical systems; the development of methods of analysis of drugs in pharmaceutical systems; the action of drugs on the molecular level; the selective toxicity of antimicrobial agents; the isolation and elucidation of naturally occurring compounds having medicinal value; the factors influencing the stability of drugs; and the factors influencing the availability of drugs to the biological organism.

In planning a program of study, students may draw on a wide selection of graduate courses offered in other departments of the University.

DEGREE REQUIREMENTS

A candidate for the degree of Master of Science in pharmaceutical sciences is expected to demonstrate mature knowledge of the pharmaceutical sciences, and he must meet the following requirements:

1. He must complete at least 30 points of graduate courses at Columbia University in not less than one year of resident study. The following course is prescribed for all students: *Chemistry G4091-G4092—Physical chemistry*. An acceptable undergraduate course in physical chemistry may satisfy the requirements for *Chemistry G4091-G4092* but carries no point credit toward the degree. The remainder of the student's program may be chosen from an approved list of elective courses offered by the Faculty of Pharmaceutical Sciences and other divisions of the University. The student's program is subject to the approval of the chairman of the Graduate Committee.
2. He must participate satisfactorily in the graduate seminars held during his residency.
3. He must submit an acceptable essay on a topic approved by the Graduate Committee.
4. He must pass the examinations required by the Graduate Committee.

PROGRAM IN ADMINISTRATIVE PHARMACY

Students enrolled in this new program prepare for executive careers in various aspects of management in pharmaceutical and related industries. The curriculum is related to the student's background in pharmaceutical sciences and includes work in enterprise organization, operation, and control; market research; advertising; sales; and administration within government agencies and pharmaceutical associations.

Courses specifically related to the structure and marketing dynamics of the pharmaceutical industry are given at the College of Pharmaceutical Sciences by faculty members and by distinguished leaders in the pharmaceutical industry. In the courses concerned with general social and economic business factors, the outstanding programs and facilities of Columbia University are available to students. Included in the curriculum are opportunities for intensive study in specialized subjects such as industrial pharmaceuticals, business economics, international business, marketing and research, production management and industrial relations, health care institutions, and public law and government.

This program can be completed in three terms of full-time study. When appropriate courses can be scheduled in the Summer Session, it is possible to complete

the program within one calendar year. By special arrangement, opportunity for part-time study can be made available.

PROGRAM IN INSTITUTIONAL PHARMACY

This combined academic residency program, designed to prepare students for administrative and technical responsibilities in the expanding areas of hospital and institutional pharmacy, consists of intensive scientific training coupled with administrative orientation in the pharmacy service and in other hospital departments, thus enabling graduates to enjoy an integrated relationship with other members of the hospital health team. A balanced academic program, including special elective courses, permits cultivation of individual interests.

A stipend has been established for the 2,000-hour residency tour which has been patterned along the guidelines established by the Joint Committee of the American Association of Colleges of Pharmacy and the American Society of Hospital Pharmacists.

Three hospitals in New York City affiliated with the College for the residency program—Montefiore Hospital and Medical Center, Lenox Hill Hospital, and Mount Sinai Hospital—provide opportunities for students to gain understanding of the entire hospital operation through service in all hospital departments.

PROGRAM IN PHARMACEUTICAL ENGINEERING

This program is designed for students who have earned a bachelor's degree in pharmacy or in chemical engineering, and intend to do graduate work in industrial pharmaceutical science as preparation for research and developmental work in the new and expanding field of pharmaceutical engineering. These students specialize in industrial pharmaceuticals and do research in pharmaceutical process design and improvement. The program of study is under the joint sponsorship of the Faculty of the College of Pharmaceutical Sciences and the Department of Chemical Engineering of the School of Engineering and Applied Science. For further information, students should consult Dean Joseph L. Kanig.

► THE DOCTOR OF PHILOSOPHY PROGRAM

The objectives of the Ph.D. degree program include the acquisition of an advanced knowledge of the fundamental principles of the pharmaceutical sciences and the ability to contribute to this fundamental knowledge through research.

A program of study leading to the degree of Doctor of Philosophy will usually require at least three years of full-time graduate work. A student's candidacy for the degree must be certified by the Dean of the Graduate Faculties of the University. Application for certification can be made only after the student meets the general requirements for candidacy, as stated in the bulletin of the Graduate Faculties. The Doctor of Philosophy degree is awarded only under the subcommittee on pharmaceutical sciences of the Graduate Faculties; it is not offered under the Faculty of Pharmaceutical Sciences.

Further details of the admission and degree requirements are given in the bulletin of the Graduate Faculties. Students who have been admitted and who wish to obtain a detailed view of the sequences of tests, oral examinations, special options, and the like, should consult the subcommittee's section of the *Graduate Student's Guide*.

Requests for application forms for admission should be addressed to The Graduate Faculties Office of Admissions and Financial Aid, 106 Low Memorial Library, Columbia University, New York, N.Y. 10027.

► COURSES OF INSTRUCTION AND RESEARCH

The courses listed below are conducted at the College of Pharmaceutical Sciences. Courses with the "Q" prefix are also listed in the 1968–1969 Graduate Faculties bulletin under the program for the subcommittee on pharmaceutical sciences. See the Key to Course Listings in the Graduate Faculties bulletin for the significance of the 4000, 6000, 8000, and 9000 numbering.

Two hyphenated numbers signify a course that runs through both terms. The first half is prerequisite to the second half unless the course description says otherwise.

The number of points of credit a course carries *each* term is given in boldface type on the right margin of the course entry.

PHARMACEUTICAL BIOLOGY

Pharmaceutical Biology 121. Principles of biological assay. Autumn. 3 pts.

1 hour lecture, 4 hours laboratory, to be arranged. Professor Merker.

Prerequisite: pharmacology. Laboratory fee: \$25.

The quantitative standardization of drugs by biological methods and the application of statistical methods of analysis to biological experimentation.

Pharmaceutical Biology 133. Advanced pharmacognosy. Autumn. 3 pts.

2 hours lecture, 6 hours laboratory, to be arranged. Professor Pokorny.

Prerequisite: elementary pharmacognosy and organic chemistry. Laboratory fee: \$25.

This course carries credit only toward the M.S. degree.

Advanced macroscopic, microscopic, and microchemical techniques for the identification and evaluation of products of natural origin.

Pharmaceutical Biology Q6225x–Q6226y. Modes of drug action. 3 pts.

3 hours lecture to be arranged. The staff.

Given in alternate years; not given in 1969–1970.

Prerequisite: pharmacology, advanced biochemistry, and *Chemistry G4092*.

The relation of physical and chemical properties of drugs to their biologic action and a physicochemical treatment of the factors involved in biological response. Topics include relation of molecular constitution and molecular properties of structurally specific drugs to their biologic activity, the physical properties of structurally nonspecific compounds, interaction between drugs and enzyme systems, physical effects which modify the degree of drug action, absorption of molecules and ions through membranes and transport in body fluids, detoxication, drug resistance, synergism, and potentiation.

Pharmaceutical Biology Q8230y. Biosynthesis of natural products. Spring. 3 pts.

1 hour lecture, 4 hours laboratory, to be arranged. Instructor to be announced.

Prerequisite: advanced biochemistry.

The metabolic pathways in the biosynthesis in plants of various compounds of medicinal importance, including alkaloids, terpenes, glycosides, and others. The application of radioisotopic tracers, precursors, feeding experiments, and other techniques.

Pharmaceutical Biology Q9303x–Q9304y. Special problems. 1 to 3 pts.
 Hours to be arranged. The staff.
 Laboratory fee: \$25.

PHARMACEUTICAL CHEMISTRY

Pharmaceutical Chemistry Q4101x. Radioisotopes in the pharmaceutical sciences. Autumn. 3 pts.
 2 hours lecture, 3 hours laboratory, to be arranged. Professor Farhi.

Laboratory fee: \$60.

An introduction to the properties of radioisotopes and the characteristics of radiation. Production and standardization of radioisotopes, detection and measurement of radiation, radiation dosimetry and shielding, precautions in the handling of radioisotopes, and preparation of radioisotope-labeled compounds. Radioisotopes used in medicine, sterilization with radiation and radioisotopes, and the application of radioactive tracers to research problems. Laboratory experiments include methods of radiation detection, utilizing Geiger-Müller, proportional gas flow, and scintillation counters; the preparation of samples for measurement; gamma-ray spectrometry; determination of isotope distribution in living tissue; isotope dilution methods; and the application of radioisotopes to pharmaceutical research.

Pharmaceutical Chemistry Q6111x–Q6112y. Instrumental methods of analysis. 6 pts.
 3 hours lecture, 6 hours laboratory, to be arranged. Professor Farhi.

Prerequisite: quantitative analysis and *Chemistry G4091–G4092*. Laboratory fee: \$25 each term.

Advanced methods of physicochemical analysis, including electrometric, opticometric, and chromatographic analysis. Laboratory experiments in the development of analytical procedures for simple and complex pharmaceutical preparations.

Pharmaceutical Chemistry Q6208y. Kinetics in homogeneous systems. Spring. 2 pts.
 2 hours lecture. Professor Willi.

Given in alternate years; not given in 1969–1970.

Prerequisite: *Chemistry G4091–G4092* or the equivalent.

Rates and orders of reactions in homogeneous systems; the collision theory and theory of absolute reaction rates; detailed analysis of catalysis involved in pharmaceutical systems; experimental methods; influence of temperature, light, solvent, ionic strength, and dielectric constant on reaction rates; accelerated stability analysis; oxidative and hydrolytic degradation of drugs and drug stabilization.

Pharmaceutical Chemistry Q6223–Q6224. Advanced medicinal chemistry. 2 pts. Professor Hite. Given in alternate years; not given in 1968–1969; to be given in 1969–1970.

Structures, properties, syntheses, and reactions of selected naturally occurring and related medicinal compounds, with emphasis on the methods of structure elucidation. The application of physical methods—including optical rotation; ultraviolet; visible, and infrared absorption spectra; dipole moments; and dissociation constants—to structure determination. The establishment of the stereochemistry of certain compounds by conformational analysis and other methods. The assignment of pharmacophoric groups.

Pharmaceutical Chemistry Q9303x–Q9304y. Special problems. 1 to 3 pts.
 Hours to be arranged. The staff.
 Laboratory fee: \$25.

PHARMACEUTICS

Pharmaceutics 109–110. Principles of industrial pharmaceutics. 4 pts.
 2 hours lecture, 4 hours laboratory, to be arranged. Professor Kanig and assistants.

Laboratory fee: \$40 each term.

Theoretical and experimental analysis of problems associated with principles and methods of formulating and developing medicinal dosage forms. Emphasis is on laboratory work in the application of recent advances to problems on the industrial pharmaceutical level.

Pharmaceutics 113-114. Biopharmaceutics.**2 pts.****2 hours lecture. Instructor to be announced.**

Given in alternate years; not given in 1969-1970.

Prerequisite: *Chemistry G4091* or the equivalent.

The biophysicochemical factors which influence the kinetics of drug absorption, distribution, metabolism, and excretion, and the role of the dosage form and its component parts in the absorption process. Current *in vitro* and *in vivo* methods of dosage form evaluation, in relation to the biological availability of active ingredients. The design of dosage forms, their physical stability and biological availability.

Pharmaceutics Q6211x. Homogeneous systems.**Autumn. 2 pts.****2 hours lecture. Instructor to be announced.**

Given in alternate years; not given in 1969-1970.

Prerequisite: *Chemistry G4091-G4092* or the equivalent.

The physical properties of homogeneous pharmaceutical systems, in terms of modern theories of solution which utilize the properties of the liquid state as their basis. The applications of thermodynamic principles to elucidate the formation and the characteristics of ideal and real solutions and factors influencing equilibria in these solutions.

Pharmaceutics Q6214. Interfacial phenomena. 3 pts. Professor Weiner. Given in alternate years; not given in 1968-1969; to be given in 1969-1970.

A structural and theoretical consideration of interfacial phenomena; thermodynamics of surfaces, orientation at an interface, capillary pressure, Gibbs adsorption isotherm, properties of monomolecular films, with particular reference to rates of reaction and penetration; the electrical aspects of surface chemistry, including the electrical double layer, zeta potential, and electrocapillarity; the surface of solids, adsorption of gases and vapors by solids, with a discussion of the Langmuir and Brunauer, Emmett and Teller adsorption isotherms; solid-liquid interfacial free energy, contact angles, heat of immersion and adsorption from solution; structure and properties of micelles, with emphasis on theoretical consideration of solubilization.

Pharmaceutics Q6213x. Heterogeneous systems.**Autumn. 3 pts.****3 hours lecture. Instructor to be announced.**

Given in alternate years; not given in 1969-1970.

Prerequisite: *Chemistry G4091-G4092* or the equivalent.

Modern views of the colloid state; preparation of colloids, nucleation, growth and coagulation, aspects of sedimentation and flocculation; electric properties of colloids, electrokinetics, origin and effect of charge, structure of double layer; stability of lyophobic and lyophilic colloids, aerosols and foams; Newtonian and non-Newtonian rheological behavior; micromeritics.

Pharmaceutics Q9303x-Q9304y. Special problems.**1 to 3 pts.****Hours to be arranged. The staff.**

Laboratory fee: \$25.

PHARMACEUTICAL SCIENCES**Pharmaceutical Science Q9301x-Q9302y. Seminar.****0 or 1 pt.****1½ hours to be arranged. The staff.***All graduate students must register for this course each term while in residence.*

Discussion of current research in the pharmaceutical sciences.

Pharmaceutical Science Q9307x-Q9308y. Research.**Points variable.****The staff.**

Laboratory fee: \$25 each term. This fee will be waived for graduate students who have been certified as Ph.D. degree candidates.

Pharmaceutical Science S9309A. Research.**May 27-Sept 13. Points variable.****The staff.**

Laboratory fee: \$25 each term. This fee will be waived for graduate students who have been certified as Ph.D. degree candidates.



THE STUDY OF RADIOISOTOPES IS A PART OF MODERN PHARMACEUTICAL TRAINING



THE AEROSOL LABORATORY IS USED IN TEACHING AND RESEARCH

ADMINISTRATIVE PHARMACY

Pharmaceutical Administration 131. Legal regulations of the pharmaceutical industry. Autumn. 3 pts.

3 hours lecture. Professor Horowitz.

The FDA—a study of the law, the administrative agency, and procedures. The FTC—imperfect competition and the law.

Pharmaceutical Administration 142. Organization of the pharmaceutical industry. Spring. 3 pts.

3 hours lecture. Dr. Faust.

Structure and dynamics, marketing plans and procedures. Evaluation of policies and trends. Term projects on a particular segment or function of industry required.

Pharmaceutical Administration 144. Pharmaceutical socioeconomics. Spring. 3 pts.

3 hours lecture. Instructor to be announced.

A socioeconomic study of the relation of pharmacy to health care needs, resources, and institutions. Government and private prepayment plans, assistance, and financing.

Pharmaceutical Administration 151. Budgetary control and firm management.

3 hours lecture. Instructor to be announced. Autumn. 3 pts.

The utilization of budgetary control techniques in the management function of a planning program. Return on investment concept as a management tool. Problems of leadership.

Pharmaceutical Administration 301–302. Colloquium. 0 or 1 pt.

1½ hours to be arranged. The staff.

All graduate students in the administrative pharmacy program must register for this course each term while in residence.

Discussion of current literature and research in pharmacy administration. Practice in casework and problem solving.

Pharmaceutical Administration 303–304. Research and thesis. 0–3 pts.

Hours to be arranged. The staff.

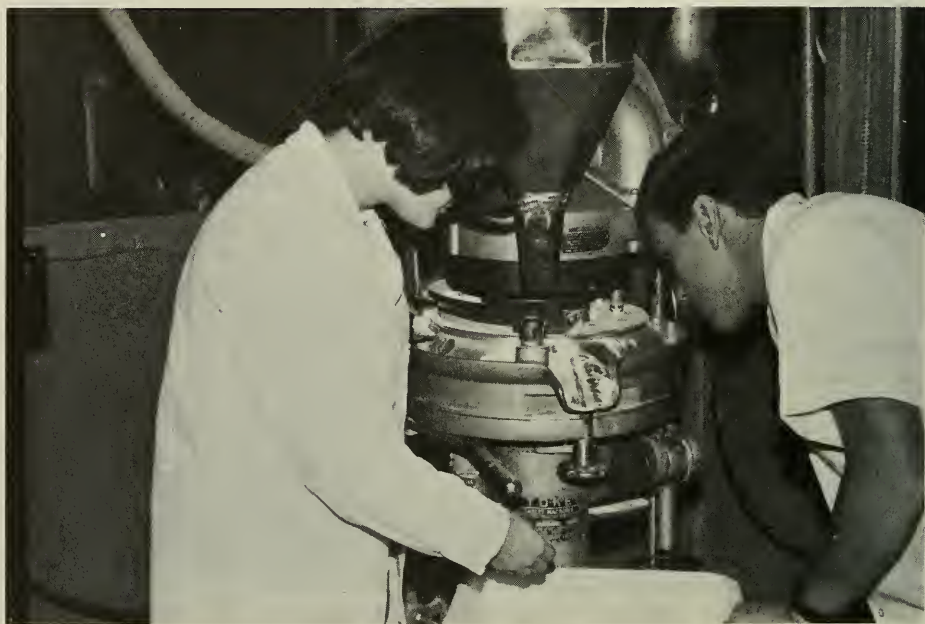
Individual research in various areas of pharmacy administration.

BUSINESS COURSES

The following courses offered at the Graduate School of Business are ordinarily required of all students: *Business B6006—Managerial economics* or *B6005—Business in a changing economy*, *B6011—Human behavior in organizations*, *B6015—Quantitative methods, III: probability, statistics, and decisions*, and *B6017—Administration of the firm*.



STUDENTS EVALUATE REACTION OF ANIMAL TISSUES TO EXPERIMENTAL DRUGS



STUDENTS LEARN TO OPERATE A TABLET PRESS

Evening Program in Applied Pharmaceutical Sciences

The College of Pharmaceutical Sciences program in applied pharmaceutical sciences provides a unique educational experience for individuals with research or administrative responsibilities within the pharmaceutical, cosmetic, and allied industries. The "explosive" growth and expansion of these industries, accompanied by increasing diversification, makes it highly desirable for individuals to keep abreast of the latest developments in their specialized areas. In a coordinated program designed to meet the immediate needs of industry and its personnel, the College of Pharmaceutical Sciences has sought to bridge the educational gap that exists between college education and practical industrial experience. These courses, taught by distinguished industrial and academic leaders, have been structured to present subjects of industrial importance. They are, therefore, more product-oriented than are courses in undergraduate or graduate degree programs.

The Columbia University Certificate in Applied Pharmaceutical Sciences is awarded to students who complete 30 points of course work in this program, provided all other requirements are met. It is also possible to register for individual courses.

For further information write to the Director of Extension Services, College of Pharmaceutical Sciences, 115 West 68th Street, New York, N.Y. 10023.



EVALUATION OF MONOMOLECULAR FILMS ON SPECIAL APPARATUS FOR RESEARCH



A SEMINAR ON MODERN MEDICINALS

Registration and Expenses

► REGISTRATION

During the registration period at the beginning of each term, each student must register in person for the courses he proposes to take during that term. Before registration, each student receives a notice specifying when and where he is to report.

All students are asked to give social security numbers when registering in the University. Those who do not now have a number should obtain one from their local social security office well in advance of registration.

Late registration is permitted only upon the payment of an additional fee of \$25 and if satisfactory cause for the delay can be shown.

A veteran who expects to have his expenses defrayed under Veterans Administration regulations must present his certificate of eligibility at the time of registration.

► FEES

The registration fee, the breakage deposit, the laboratory fee, the student activities fee, and the laboratory coat fee are payable each term as part of registration. Tuition may be paid in either of two ways: (1) in full at registration or (2) one half at registration and the other half at the midterm date (see the Academic Calendar for dates). Advice concerning tuition payment plans available through banks may be obtained from the Office of Admissions.

The following fees are subject to change at any time at the discretion of the Trustees:

Registration fee for each term	\$ 10.00
Tuition for either degree program, each term	650.00
(A program of less than 12 points in the College of Pharmaceutical Sciences is charged for at the rate of \$55 a point. Courses taken in other departments of the University will be charged for at the prevailing rates.)	
General fee	50.00
Breakage deposit for each term (refundable less charges for replacement, materials, and depreciation)	25.00
Laboratory fee for each laboratory course	25.00
Application fee for a degree	20.00
Student activities fee (B.S. program only), each term	20.00
Locker fee (first registration only)	2.00
Health Service Fee (University dormitory residents only)	10.00

Privileges

Registration after dates set in the Academic Calendar	25.00
Transcripts of record	1.00
Chemistry laboratory gown purchase (freshmen)	8.00
Laboratory coat rental, each term (when required)	8.00
Laboratory gown rental, each term (when required)	10.00

ADJUSTMENT OF FEES

There is no refund of any part of the laboratory gown rental fee, the registration fee, the late-registration fee, general fee, the laboratory fee, the locker fee, or the the application fee for a degree. The student activities fee is not refunded when a student withdraws after the last date for change of program. Tuition will be returned only up to and including the last day for change of program, as announced in the Academic Calendar. After this date, no refund of tuition will be authorized for withdrawal from individual courses.

In instances of total withdrawal from the College, a partial refund of tuition *may* be authorized. Any adjustment of tuition is reckoned from the day on which the College receives the student's written notice of withdrawal. After the second Friday of each term, 20 percent of the tuition is retained for each week, or part of a week, of the term up to the date on which the student officially withdraws. Consequently, when the student withdraws on or before the second Friday of either term, the tuition he has paid will be refunded in full—less \$50.

Any authorized adjustment of the breakage deposit is made each June, at the end of the school year.

BOOKS AND SUPPLIES

It is estimated that \$500 will cover the cost of the textbooks and necessary apparatus required for the program leading to the B.S. degree.

► STUDENT EMPLOYMENT

Students seeking employment should consult Mr. Stephen M. Gross, Assistant to the Dean.

► STUDENT LOAN FUNDS

A number of sources are available for loans to deserving students who have reached sophomore or higher status. Those of particular interest are the Alumni Association Scholarship Aid Fund, the Women's Auxiliary of the Pharmaceutical Society of the State of New York, the John W. Dargavel Foundation, the Women's Auxiliary of the American Pharmaceutical Association, the New York Higher Education Assistance Corporation, the Cuban Loan Program, and the National Defense Student Loan program. The College participates in any special student aid

programs sponsored by the federal or state governments. Tuition payment plans are also available through many New York City banks.

Complete details may be obtained from the Assistant Director of Student Personnel Services, College of Pharmaceutical Sciences, Columbia University, 115 West 68th Street, New York, N.Y. 10023.

► HOUSING

Approved residence accommodations are available for undergraduate and graduate students who are required by circumstances to live away from home. For information regarding housing facilities, the student should write to the Associate Dean for Student Affairs.

Student Life

► STUDENT ORGANIZATIONS

These organizations are under the general direction of the Committee on Student Affairs, which consists of members appointed from the faculty and administration.

Students of the College of Pharmaceutical Sciences must be in good scholastic standing to be eligible to participate in competition (athletic and nonathletic), organizations, performances, publications, and other cocurricular activities. Exceptions may be made only with the permission of the Associate Dean for Student Affairs.

THE STUDENT COUNCIL AND THE STUDENT CHAPTER OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

The Student Council in the College of Pharmaceutical Sciences consists of elected representatives from the different classes. It cooperates with and is responsible to the Committee on Student Affairs in the supervision of student interests and activities.

The Student Chapter of the American Pharmaceutical Association at Columbia, to which all undergraduates belong, brings to the attention of students the professional activities, the advances, and the problems of the American pharmacist. Guest lecturers of prominence, professional displays, contests, and other programs are conducted by the A.Ph.A. Student Chapter. Membership fees include subscriptions to either or both of the monthly journals published by the parent organization. The Chapter also is active in the affairs of the International Pharmaceutical Students Federation, participating in the exchange program and having representation in the annual convention.

The Columbia University Student Council, composed of elected representatives from the students of the schools and faculties of the University, represents the students in matters affecting the student body as a whole, with the object of promoting understanding and cooperation among the students, faculty, and administration.

FRATERNITIES AND SORORITIES

The following fraternities maintain active chapters at the College: Kappa Psi, Rho Pi Phi, Delta Sigma Theta, and Alpha Zeta Omega. One sorority, Lambda Kappa Sigma, is active in the College.

► STUDENT COUNSELING

There are two groups of student counselors, both responsible to the Associate Dean for Student Affairs.

The class advisers are responsible for counseling the class as a whole with respect to class activities and faculty regulations; one faculty member is assigned to each class. The faculty advisers are faculty members from whom students may seek counseling in matters either academic or personal.

In addition, the Chaplain of the University, the three counselors—Protestant, Roman Catholic, and Jewish—and the advisers to the other religious groups are available for consultation in their offices in Earl Hall on the Morningside campus.

Students are invited to attend the daily services held in St. Paul's Chapel and the meetings, lectures, and activities of the various religious organizations.

► FOREIGN STUDENTS

The Office of the Foreign Student Adviser, 211 Foreign Student Center, assists foreign students with their special problems, helps coordinate all University activities relating to foreign students, and arranges social activities.

The Office handles all questions concerning the United States Immigration and Naturalization Service and requests for all types of certification to be used for immigration, foreign exchange, and other purposes.

ORIENTATION PROGRAM FOR NEW FOREIGN STUDENTS

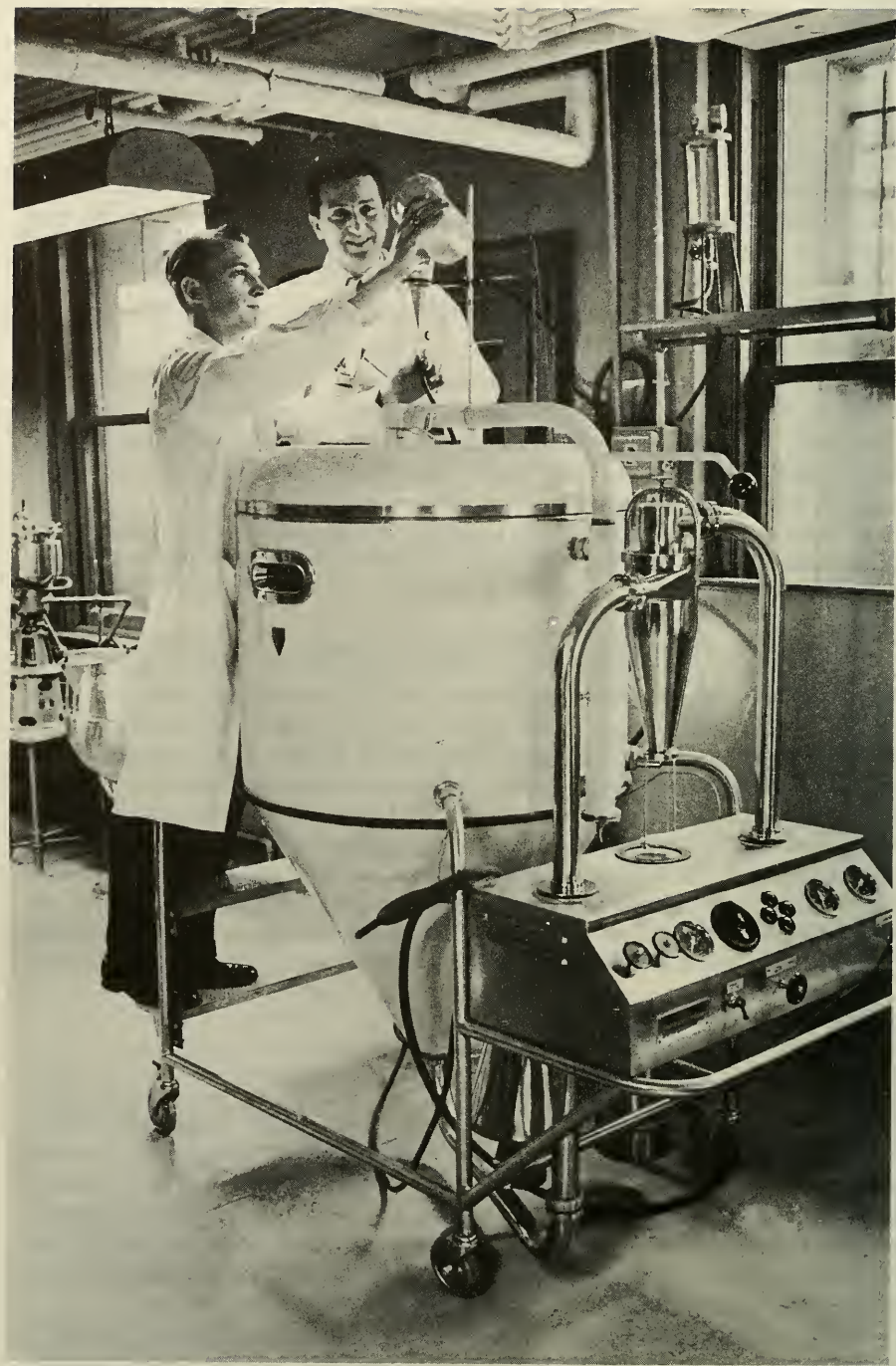
The Foreign Student Center orientation program for new foreign students is held each fall to introduce students to the Center and its services, the University, and New York City. The five-day program includes the English Language Placement Test, information about registration, tours of the Morningside campus and its library, a reception to meet the President of the University, a coffee hour with the International Students Club, and an opportunity to visit an American family.

The program begins September 17 at 10 a.m. in the auditorium of Earl Hall, on the Morningside campus. At that time students receive schedules for the rest of the activities. Although foreign students are not required to attend, they are welcome to come to any part of the program which is of interest to them.

► LIBRARIES

The libraries of the University, which are available to all students, contain over 3,700,000 volumes, exclusive of unbound pamphlets. The main collection is housed in the Nicholas Murray Butler Library on 114th Street near Broadway. The various departments of instruction have special libraries to serve their needs. The Chemistry Library in Chandler Laboratories, the Physics Library in Pupin Physics Laboratories, the natural science libraries (geology, psychology, zoology, and botany) in Schermerhorn Hall, and the Medical Library at 168th Street and Broadway are of particular interest to students in the College of Pharmaceutical Sciences.

The library of the College of Pharmaceutical Sciences contains more than fourteen thousand volumes, including reference works on pharmacy and allied branches of science as well as an extensive series of periodicals in English and in foreign languages relating to chemistry, pharmacy, botany, and allied sciences, including all important journals of interest to pharmacists.



THE PREPARATION OF MEDICINALS BY SPRAY-DRYING

Honors and Awards

► UNDERGRADUATE HONORS AND AWARDS

Students who demonstrate outstanding scholastic ability and personal attributes become eligible for nomination to the Dean's List, for election to Rho Chi Society, and for the several scholarships, prizes, and awards described on pages 41–47.

The Dean's List, prepared at the close of each term, bears the names of those students whose quality point averages are 3.4 or higher and who have no grade lower than C.

Rho Chi Society, the national pharmaceutical honor society, has as its fundamental objective the advancement of the pharmaceutical sciences through encouragement and recognition of high scholarship. Students who have achieved upper junior and senior status and whose scholarly and personal attainments have met the high standards of Rho Chi, are eligible for nomination to membership. On the same basis, the privilege may be extended to graduate students and alumni of the College of Pharmaceutical Sciences.

HONORS PROGRAM

The College of Pharmaceutical Sciences is motivated by a desire to provide instruction to students of diversified abilities. Within the framework of this obligation the College also recognizes the development of the superior student because he serves as a stimulus for other students, and in so doing contributes to the intellectual leadership of the profession of pharmacy.

The purpose of the Honors Program is to enable especially capable freshmen, and upper-class students who have shown superior scholastic achievement to participate in intensive specialized work under the guidance of members of the faculty. Those students who fulfill the program's requirements will receive special honors, which will be inscribed on their diploma upon graduation.

Thus, the Honors Program is conceived as a challenge to outstanding students to assume responsibilities equal to their abilities.

For further information, contact the Associate Dean for Student Affairs.

SCHOLARSHIPS FOR NEW STUDENTS

One half of the amount of all scholarships will be credited toward payment of tuition for the autumn term; the balance will be credited toward payment of tuition for the spring term if a satisfactory average is maintained and the need continues.

The *Elmer H. Bobst Scholarships*. Five half-tuition scholarships for entering first-year students are available through the generosity of Mr. Elmer H. Bobst, Chairman of the Board, Warner-Lambert Pharmaceutical Company. Recipients will be selected on the basis of sincerity of purpose and need of such assistance.

The *Trustee's Scholarships*, established by the Board of Trustees, provide scholarships of \$300 each for a limited number of new students. Eligibility for these scholarships is based on financial need and demonstrated potential for successful scholarly attainment. These scholarships are awarded, on application, usually for a period of one academic year only.

New York State Awards. New York State offers various types of financial assistance to qualified college students who are state residents. Information may be obtained from the Office of Admissions or by writing to the Department of Education, Regents Examination and Scholarship Center, Albany, N.Y. 12201. *Regents College Scholarships* carry awards of \$250 to \$1,000 a year depending on need; a candidate should consult his high school guidance counselor or principal for instructions on how to apply. *Scholar Incentive Awards* have a value of \$100 to \$500 depending on need. Application for awards should be filed with the Regents Examination and Scholarship Center two months in advance of the beginning of the term for which the grant is to apply.

SCHOLARSHIPS FOR UPPERCLASSMEN

The general basis for the selection of scholarship recipients is character, scholastic aptitude, and need. The specific requirements are described under each scholarship.

One half of the amount of all scholarships will be credited toward payment of tuition for the autumn term; the balance will be credited toward payment of tuition for the spring term if a satisfactory average is maintained and the need remains.

The *Max Blank Memorial Scholarship*, established by his family in memory of Max Blank, Class of 1937, is awarded annually to a worthy student who has successfully completed in this College the course work of the second year. The value of this scholarship is \$300, to be applied toward the tuition of the third year.

The *Alexander Block Memorial Scholarship*, founded by the employees of the Block Drug Company in memory of Alexander Block, Class of 1907, is awarded annually to a student following completion of the first year in the College of Pharmaceutical Sciences. The value of the award is about \$100, the annual income of the fund, to be applied toward the tuition of the second year.

The *American Foundation for Pharmaceutical Education Scholarships*, three scholarships of \$200 each, are awarded to three students entering the fourth or fifth year in need of such support.

The *John W. Dargavel Scholarship* of \$200, sponsored by the John W. Dargavel Foundation of the National Association of Retail Druggists, is awarded annually to a student entering the third, fourth, or fifth year.

The *Health Professions Scholarships*, established by the Federal Health Professions Educational Assistance Amendments of 1965, are awarded annually to students entering the upper three years. The purpose of the scholarships, which may not exceed \$2,500 each in any one year, is to enable talented students requiring financial assistance to undertake the course of study required to enter the pharmaceutical profession. These scholarships are available only to students who would be unable to pursue the required studies without financial assistance.

The *J. Leon Lascoff Memorial Scholarship*, founded by Dr. Frederick D. Lascoff in memory of his father, J. Leon Lascoff, Trustee, 1916–1940, and a vice president of the College, 1940–1943, is awarded annually to a student entering the fourth year, on the basis of excellence in previous courses in pharmacy laboratory. This award of \$200 is to be applied toward the tuition of the fourth year.

The *Lederle Tutorial Scholarships*, established by the Lederle Laboratories, a division of American Cyanamid, Pearl River, New York, provide two scholarships of \$300 each to students exhibiting a proficiency in the first term of selected freshman courses. The recipients will be required to devote approximately four hours each week to tutoring students in the second term of these freshman courses.

The *Samuel J. Moritz Scholarship*, provided through bequest and having a value of approximately \$200, is awarded annually to a student enrolled in the College of Pharmaceutical Sciences.

The *I. Neustaedter Memorial Scholarship*, founded by the Lindemann Foundation, Incorporated, as a tribute to Isidore Neustaedter, for many years a distinguished teacher in the College of Pharmaceutical Sciences, is awarded annually to a student entering the fourth year. The value of the award is \$300.

The *Past Presidents' Award* of \$100, offered by the Women's Auxiliary of the Pharmaceutical Society of the State of New York and applicable to the tuition of the fifth year, is awarded to the student whose academic record at the end of the fourth year shows the greatest improvement over that of the first year.

The *Henry Pfeiffer Scholarships*, established as a memorial to Henry Pfeiffer by the trustees of his estate, provide scholarships of \$200 each for three worthy second-year students. The scholarships are awarded on the basis of financial need, scholarly ability, and the personal qualifications of the applicant for the practice of pharmacy. They are ordinarily awarded to students for one year only, although students of promise may receive scholarship aid in subsequent years if funds are available. If the scholar fails to maintain an average of B in his studies, or if for any other reason his continued holding of a scholarship is found to be undesirable, the appointment may be terminated at the end of a term.

The *Trustees' Scholarships*, established by the Board of Trustees, provide scholarships of \$300 each for a limited number of students. Eligibility for these scholarships is based on financial need and demonstrated potential for successful scholarly attainment.

The *Murray Wollan Memorial Fund*, established by the family and friends in honor of Murray Wollan, Class of 1920, who distinguished himself by the high level of his long professional practice, provides assistance to worthy students for the purchase of textbooks and supplies.

PRIZES

The *Samuel Abate Award*, a bronze plaque established by the Class of 1958 in memory of their beloved classmate Samuel Abate, whose death occurred during the senior year, is awarded to the student entering the fifth year who, in the opinion of the fifth-year class, has made the greatest contribution to promoting its welfare.

The *Alpha Zeta Omega Award*, a set of reference books, is given annually by the Zeta Chapter of Alpha Zeta Omega to the fourth-year student who has achieved the greatest proficiency in the science courses of the third year.

The *Alumni Association Prizes*, provided by the Alumni Fund of the College of Pharmaceutical Sciences, consist of a gold, a silver, and a bronze medal to be presented at Commencement to the three members of the graduating class who have placed respectively first, second, and third in all subjects taught during the fifth year.

The *Apothekan Award* of \$50, conceived by the Apothekan Staff of 1960 and supported by succeeding staffs, is given annually to the student completing his fourth year whose interest in student publications has contributed most to the welfare of his class.

The *Max J. Breitenbach Prize* of \$100 is offered annually by the Trustees of the College of Pharmaceutical Sciences, in memory of Max J. Breitenbach, for many years a devoted trustee, and is awarded for the highest proficiency in the fifth year.

The *Bristol Award*, a copy of the Modern Drug Encyclopedia, is offered annually by Bristol Laboratories, Incorporated, to a fifth-year student who has made a substantial contribution in advancing the interests of his class.

The *Class of 1922 Samuel B. Reiman Award*, consisting of the latest edition of the United States Dispensatory suitably embossed on the cover, is presented to the president of the graduating class in memory of Samuel B. Reiman, president of the Class of 1922, who died in January 1947.

The *Dean's Award*, provided by Johnson and Johnson, is awarded annually to the student who performs outstandingly in the area of pharmacy administration. The award consists of a hand-turned replica of a Revolutionary War mortar and pestle. The recipient is eligible to compete for a \$1,000 scholarship for graduate study in pharmacy administration or business management.

The *Diekman Prize*, founded in 1930 by the Dante Circle in honor of the late Dr. George C. Diekman, consists of a gold charm and is awarded to that student who has maintained the highest average in courses in the pharmacy and chemistry of medicinals.

The *August A. DiSomma Award*, established by the Student Council in memory of Dr. August A. DiSomma, for many years a devoted professor of chemistry, is a U.S. Savings Bond presented annually to the student who has shown the highest proficiency in the chemistry courses of the first three years.

The *Louis Dohme Prize* of \$50, founded by Ernest Stauffen in memory of Louis Dohme, is awarded annually to the student who exhibits the best practical knowledge of the drugs of natural origin of the United States Pharmacopeia and National Formulary, as determined by the laboratory records and examinations in pharmacognosy.

The *Kappa Psi Award*, a gold medal, is given annually by the Gamma Chapter of Kappa Psi to the candidate for the degree of Bachelor of Science in pharmacy who maintains the highest standing throughout the course.

The *Leiterman Award*, a gold medal offered annually by Miss Lillian Leiterman (1911), is awarded to the woman graduate who has maintained the highest standing throughout the course.

The *Lilly Achievement Award*, a gold medal, is awarded to the graduate who has demonstrated superior scholastic and professional achievement, leadership qualities, as well as professional attitude. These qualities, along with academic performance, will be considered in the selection of the individual for this award.

The *McKesson & Robbins Award*, a plaque and gavel trophy, is presented annually by McKesson & Robbins, Incorporated, to the student who has served as president of the student chapter of the American Pharmaceutical Association.

The *Merck Awards*, a certificate and a set of reference books, are given to the graduate who attains the highest average in pharmacology and to the graduate who attains the highest average in dispensing pharmacy.

The *Pharmaceutical Society of the State of New York* offers a five-year membership to the graduate who, in the opinion of the class, has been foremost in promoting student welfare.

The *Olshansky Memorial Award*, a gold medal, founded by the students in attendance in 1923–1924, in memory of their beloved instructor, Jacob Calman Olshansky, whose death occurred in that academic year, is awarded annually to the graduate who has attained the highest average in pharmacy courses of the fifth year.

The *Rexall Award*, consisting of a bronze mortar and pestle trophy, is awarded to the graduate who has attained distinction in cocurricular activities as a student in the College.

The *Rho Chi Awards*, sponsored by Beta Gamma Chapter of Rho Chi Society, the national pharmaceutical honor society, consist of six reference books, one awarded to each of the three highest ranking first-year students and to the three highest ranking second-year students, in recognition of superior scholastic achievement as indicated by the quality point average at the end of the respective academic years.

The *Rosen Award*, a United States Bond of \$50 at maturity, given by Max Rosen, Class of 1918, is awarded to the student who submits the best essay on pharmaceutical practice, based on his observation and experience while employed in a pharmacy.

The *George J. Seabury Award*, founded by Dr. Henry C. Lovis in memory of his uncle, George J. Seabury, for many years a member and patron of the College, is awarded annually to the student entering the fifth year who has maintained the highest standing during the preceding four years. The value of the award is about \$200, the annual income of the fund, and is to be applied toward the tuition costs of the fifth year.

The *E. R. Squibb Prize* of \$100, offered by E. R. Squibb and Sons in memory of Dr. E. R. Squibb, former lecturer in the College, is awarded annually to the student who exhibits the greatest proficiency in chemistry courses of the first two years.

The *Women's Club of the Columbia University College of Pharmaceutical Sciences Award* consists of two prizes of \$150 each, awarded to students, one man and one woman, who have demonstrated outstanding scholarship in all courses of the first year, especially in the humanities.

► GRADUATE AWARDS

Applications for the graduate fellowships must be made before April 1 on forms issued by the Office of the Dean.

GRADUATE FELLOWSHIPS

The *American Foundation for Pharmaceutical Education Fellowships* for graduate study are awarded annually. The grants cover tuition and include an amount for living expenses. Further information is available from the American Foundation for Pharmaceutical Education, 777 Fourteenth Street, N.W., Washington, D.C. 20005.

The *Bigelow Fellowship* for research in pharmacy, established through the bequest of Clarence O. Bigelow, treasurer of the College from 1897 to 1937, is awarded annually to a student who holds the bachelor's degree from the Columbia University College of Pharmaceutical Sciences or from another accredited college of pharmacy. The incumbent will undertake graduate studies in the College of Pharmaceutical Sciences and will participate in the teaching program. The value of the fellowship is \$1,800. Tuition will be remitted during the period covered by the fellowship.

The *International Flavors and Fragrances Graduate Teaching Fellowship*, providing a stipend of \$2,500 and remission of tuition, is awarded annually to a superior graduate student whose interests are in chemistry or the scientific aspects of cosmetics.

The *Isaac Plaut Fellowships* for the encouragement of graduate study and original research, founded by Albert Plaut in memory of his father, Isaac Plaut, are awarded annually to candidates for the Columbia University degree of Bachelor of Science in pharmacy who have shown scholarly ability and an aptitude for original investigation. The choice of the program and the institution for graduate study are subject to approval by the Faculty of Pharmaceutical Sciences.

The *Harry Taub Memorial Fellowship*, established by Mr. and Mrs. Richard Taub in memory of their son, Professor Harry Taub, for many years a member of the faculty of this College in the Department of Pharmacology, is awarded annually to a member of the senior class who is qualified to pursue graduate work at the College of Pharmaceutical Sciences. The value of the fellowship is about \$500, the annual income of the fund, to be applied toward the expenses of the graduate study.

RESEARCH FELLOWSHIPS

Research fellowships, provided by industrial sponsors, are available for the support of graduate student research. As a rule these fellowships are awarded only to students who have completed one year in residence.

GRADUATE ASSISTANTSHIPS

Assistantships carrying an annual stipend of \$2,500, with remission of tuition for graduate courses, are available to graduate students with superior qualifications. Assigned duties may have to do with specific courses or with research. Research assistantships and appointments above the minimum rate are not generally available to first-year graduate students.

Application should be made at the time of application for admission to graduate study and annually thereafter.

The College of Pharmaceutical Sciences reserves the right to withhold the award of any honor, scholarship, or prize if in its opinion no candidate has exhibited qualifications justifying the award or if the amount of the accumulated income in the fund is insufficient.

Regulations

THE DEAN

The Dean is the executive officer of the faculty. It is his duty, under the direction of the President, to enforce the rules of the faculty and of the Board of Trustees and to administer discipline in the case of their violation.

STUDENTS

Each person whose registration has been completed will be considered a student of the University during the term for which he is registered unless his connection with the University is officially severed by withdrawal or otherwise. No student registered in any school or college of the University shall at the same time be registered in any other school or college, either of Columbia University or of any other institution, without the specific authorization of the dean or director of the school or college of the University in which he is first registered.

Students whose religious duties conflict at any time with academic requirements should apply to the Associate Dean for Student Affairs for an equitable solution.

The privileges of the University are not available to any student until he has completed his registration. Since, under the University statutes, payment of fees is a part of registration, no student's registration is complete until his fees have been paid. No student is permitted to attend any University course for which he is not officially registered unless he has been granted auditing privileges. No student may register after the stated period unless he obtains the written consent of the Dean.

ACADEMIC DISCIPLINE

The continuance of each student upon the rolls of the College, the receipt by him of academic credits, his graduation, and the conferring of any degree or the granting of any certificate are strictly subject to the disciplinary powers of the College, which is free to cancel his registration at any time on any grounds which it deems advisable. The disciplinary authority of the College is vested in the Dean in such cases as he deems proper.

ATTENDANCE

Students are particularly requested to be in attendance at the beginning of the term in order to obtain full benefit from the course. No student will be admitted later than two weeks after the opening of the term.

Attendance is required of all students. Situations may occur in which it will be impossible for a student to attend class, and the regulations which follow take such circumstances into account. These regulations set forth the absolute maximum of

acceptable absences. Students are advised to keep well below these maximums; those who exceed the permitted number of absences in a course will receive the grade of F for the course.

1. For the didactic (lecture and conference hours) portion of *all* courses:

(a) A student who, in the judgment of the instructor in charge, has achieved the grade of C or lower by the last session of the course before the final examination period, may not exceed *three* times the number of class (clock) hours (lectures and conferences) scheduled weekly for the courses.

(b) A student who, in the judgment of the instructor in charge, has achieved the grade of B or above by the last session of a course may not exceed *four* times the number of class (clock) hours (lecture and conference) scheduled weekly for the course.

2. For the laboratory portion of a course, a student may not be absent from more than one laboratory period. A student who has more than one absence from a laboratory period must make appropriate arrangements with the instructor in charge of the course to complete the missing assigned work or the equivalent. If no such arrangements are feasible, the student automatically receives the grade of F for the entire course.

Each student is responsible for keeping a record of the date of each absence or lateness and the reason for it. A student who has had a communicable disease must present to the Associate Dean for Student Affairs a note of approval for readmission to classes signed by the student's physician.

WITHDRAWAL

An honorable discharge will be granted to any student in good standing and not subject to discipline who may desire to withdraw from the University. No student under the age of twenty-one years shall be entitled to a discharge without the assent of his parent or guardian furnished in writing to the Assistant Director of Student Personnel Services. Students withdrawing are required to notify the Assistant Director of Student Personnel Services in writing immediately.

The Dean may, for a valid reason, grant a leave of absence to a student in good academic standing.

EXAMINATIONS, GRADES, AND CREDITS

All courses usually close with the written examinations held in January and May (see the Academic Calendar on page 3). Apart from these examinations, the instructors having charge of the respective courses hold tests to determine proficiency.

The student's performance in a course is reported according to the following grades: A, excellent; B, good; C, fair; D, poor—minimum pass; F, failure.

The grade of F is recorded by the Registrar for every course in which a student is absent from the final examination unless specific authorization to apply for a special examination is obtained by the student from the Dean's office not later than the day of the examination.

When a grade of incomplete is reported in any course, the student must arrange to complete the work before the close of the following term to receive credit.

Re-examinations are held during the periods established by the faculty. They are open upon application filed with the Associate Dean for Student Affairs for students who have been absent for imperative reasons from a final examination. Only one re-examination is allowed in a given course. If a student fails to take the stated re-examination following the completion of the course in which he is deficient, no further opportunity is afforded, and a grade of F is recorded.

Each credit of work carried during a term is awarded a quality point value in accordance with the following scale: each credit of a grade of A is multiplied by 4; B by 3; C by 2; D by 1; F by 0. The sum of the quality points thus obtained, divided by the total number of credits carried, is the quality point average.

On the basis of the individual's quality point average, the faculty recommends advancement, probationary status, or dismissal for low scholarship in accordance with an index which has been established as a guide for such decisions. Recommendations for nomination to the Dean's List, for graduation, and for graduation with honors are based on the quality point average.

CREDIT FOR COURSES TAKEN OUTSIDE THE COLLEGE

Students who are duly registered in the College as degree candidates may not receive degree credit for courses completed at other institutions, including the several divisions of Columbia University, unless written approval for such courses is received in *advance of registration* from an appropriate officer of the College authorized by the Office of the Dean to grant such approval. Graduate students are directed to consult with the Chairman of the Graduate Committee before registration.

DIPLOMAS

Diplomas are issued in June at Commencement, in October, and in February and are granted only upon action of the faculty.

1968

JULY

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AUGUST

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JUNE

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JULY

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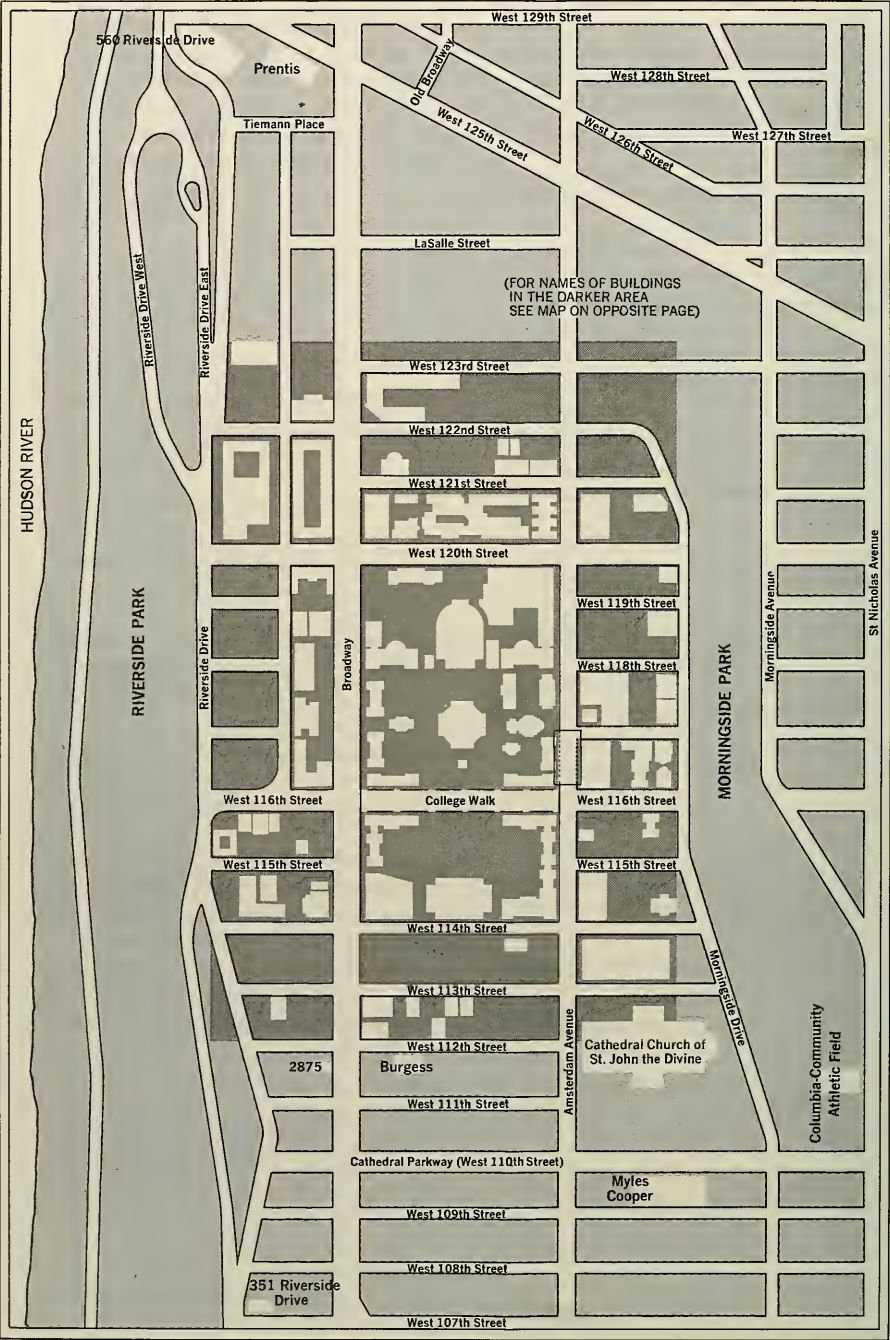
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